A STUDY TO ASSESS THE EFFECTIVENESS OF ISOMETRIC EXERCISE ON NECK PAIN AND FUNCTIONAL DISABILITY AMONG COMPUTER PROFESSIONALS AT SELECTED IT COMPANIES, CHENNAI.

SIGNATURE OF THE EXTERNAL EXAMINER

SIGNATURE OF THE INTERNAL EXAMINER

EFFECTIVENESS OF ISOMETRIC EXERCISE ON NECK PAIN AND FUNCTIONAL DISABILITY AMONG COMPUTER PROFESSIONALS AT SELECTED IT COMPANIES, CHENNAI.

Dissertation submitted to

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY

CHENNAI-600 032

In partial fulfillment of the requirement

for the degree of

MASTER OF SCIENCE IN NURSING

APRIL – 2016

EFFECTIVENESS OF ISOMETRIC EXERCISE ON NECK PAIN AND FUNCTIONAL DISABILITY AMONG COMPUTER PROFESSIONALS AT SELECTED IT COMPANIES, CHENNAI.

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EFFECTIVENESS OF ISOMETRIC EXERCISE ON NECK PAIN AND FUNCTIONAL DISABILITY AMONG COMPUTER PROFESSIONALS AT SELECTED IT COMPANIES, CHENNAI.

ABSTRACT

INTRODUCTION

Neck pain is the most common complaint among working men and women. Computer professionals sit at a computer for prolonged periods of time for their job, one of the most common complaints for them is neck pain. Neck pain may originate from any of the structures in the neck, which includes muscles, nerves, spine and the cushioning disc. Non specific neck pain is the one which is not due to serious disease or neck problem and also there is no exact cause for this neck pain but the contributing factors for non specific neck pain include having poor posture while working with computer, placing computer monitor too high or too low, sleeping in an uncomfortable position. Various measures are available for reducing neck pain includes taking pain killers, maintaining proper body mechanics and exercises. One of the exercise is isometric exercise. It is found to be effective in contracting the muscle without appreciable change in length also it increases the strength and endurance of muscle, thereby reducing the discomfort and stiffness.

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of isometric exercise on neck pain and functional disability among computer professionals at selected IT companies, Chennai.

OBJECTIVES

- To assess the neck pain and functional disability among computer professionals before and after intervention.
- To assess the effectiveness of isometric exercise on neck pain and functional disability among computer professionals.
- To associate the post interventional level of neck pain and functional disability with selected demographic and clinical variables among computer professionals.
- To correlate the post interventional level of neck pain and functional disability among computer professionals.

HTPOTHESIS

H0: There will be no significant difference between pre and post interventional level of neck pain and functional disability among experimental and control group**.**

METHODOLOGY

The research approach was experimental in nature and quasi experimental design was used. The study was conducted among 60 samples with neck pain and functional disability, (Experimental group=30; control group=30) were selected by using non probability purposive sampling technique. Pre test was conducted for both experimental and control group by using self instructional tool, modified Wong Baker FACES pain assessment scale & modified Vernon neck disability index. For the experimental group, the investigator demonstrated the neck stretching and isometric exercise and the samples were asked to do the exercise two times a day at six hours interval for 18 days (Neck Stretching- 3 days & Isometric Exercise - 15 days). Post assessment was done on the nineteenth day for both experimental and control group by using the same scale.

RESULTS

Comparison of pre and post test findings showed that in the experimental group, the mean score of neck pain was reduced from 3.83 to 1.10 and mean score of functional disability was reduced from 16.97 to 11.97, the reduction of mean score in neck pain and functional disability, was statistically significant at p=0.001 level. In control group, there was no statistically significant difference found in mean scores of neck pain and functional disability between pre and post test.

There was a statistically significant association found between post test level of neck pain with demographic & clinical variables such as age, gender, years of working experience, duration of neck pain and duration of working hours at p=0.05 level. Regarding functional disability, the post test result showed a statistically significant association with demographic & clinical variables such as age, gender, habits, duration of neck pain, and mode of transport at p=0.05 level, duration of working hours at p=0.01 level.

There was a statistically significant positive correlation(r=0.58) found between post test level of neck pain and functional disability in experimental group. Which means that, when neck pain increases the functional disability also increases.

CONCLUSION

In the experimental group during pre test, the samples had mild to moderate neck pain with mild to moderate functional disability. Whereas, in the post test the samples reported that no to mild neck pain and mild functional disability. Hence, the study proved that isometric exercise is effective in reducing neck pain and functional disability. The study findings also proved a positive relationship between neck pain and functional disability.

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TOOL TO ASSESS THE LEVEL OF NECK PAIN AND FUNCTIONAL DISABILITY

SECTION – A: DEMOGRAPHIC DATA

(Kindly go through the following statements and encircle the appropriate option given below)

1. Age in years

    a) 21-25 year

    b) 26 - 30years

    c) 31 - 35years

    d) 36 - 40years

2. Gender

    a) Male

    b) Female

3 .Marital status

    a) Single

    b) Married

    c) Widow/Widower

    d) Divorced/Separated

4. Religion

a) Hindu

b) Christian

c) Muslim

d) Others

5. Educational status

a) Diploma in computer

b) Graduate

c) Post graduate

6. Monthly income

a) Rs 10,000-15,000

b) Rs16,000 - 20,000

c) Rs21,000-25,000

d) Rs 25,000 and Above

7. Years of working experience

a) 1- 2 years

b) 2- 3 years

c) 3- 4 years

d) 4 - 5 years

8. Dietary habit

a) Vegetarian

b)Non vegetarian

9. Type of family

a) Nuclear family

b) Joint family

10 Habits

a) Alcoholism

b) Smoking

c) None

others specify.....

SECTION –B: CLINICAL DATA

(Kindly go through the following statements and encircle the appropriate option given below)

1. Do you have neck pain?

a) Yes

b) No

2. How long have you been suffering with neck pain?

a) Less than a month

b) 1-< 3 months

c) 3-< 6 months

3. What type of neck pain do you experience?

a) Tingling, Pricking

b) Pain of tight touch

c) Hot or burning

d) Electrical shock

4. How long do you work with computer per day?

a) 8 hours

b) 8-10 hours

c) > 10 hours

5. How do you commute to work place?

a) By bus

b) By two wheeler

c) By car

d) By train

6. How many hours do you travel per day?

a) 1- 2 hours

b) 2- 3 hours

c) > 3 hours

7. What is the duration of cell phone use per day?

a) 2- 4 hours

b) 4- 6 hours

c) 6- 8 hours

8. Which of the following position do you adapt regularly while working with computer?

a)

b)

c)

d)

9. Do you utilize rest hours in between work?

a) Yes

b) No

If yes specify the position you adopt regularly during rest hours

a)

b)

c)

10. Do you take any self care measures for neck pain?

a) Yes

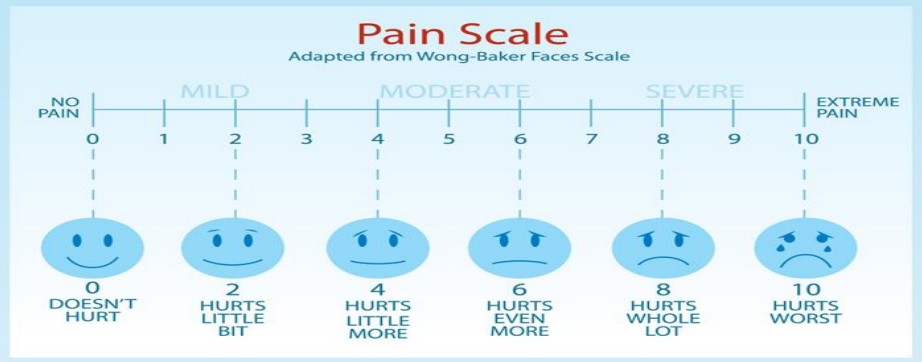
b) No

If yes specify.....

SECTION –C: PAIN ASSESSMENT SCALE

To assess the intensity of neck pain by using Wong -backer pain scale

[Kindly encircle the appropriate number given below]



SCORING AND INTERPRETATION

0-No pain

1-3-Mild pain

4-6-Moderate pain

7-10-Severe pain

SECTION-D MODIFIED VERNON NECK PAIN DISABILITY INDEX

(Kindly go through the following statements and encircle the letter of option which you feel appropriate)

1. Personal care
    a) I can look after myself without difficulty
    b) I can look after myself normally but it causes some difficulty
    c) I need some help but I manage most of my personal care
    d) I need help every day in most aspect of self care
2. Lifting
    a) I can lift heavy weights without extra pain
    b) I can lift heavy weights but it causes extra pain
    c) Pain prevents me from lifting heavy weights off the floor, but I can lift heavy weight if they are positioned properly
    d) I avoid lifting heavy objects
3. Reading
    a) I can read as much as I want to, with no pain in my neck
    b) I can read as much as I want to, with slight pain in my neck
    c) I cannot read as much as I want to, because of pain
    d) I can hardly read at all

4. Headache
    a) I have no headache at times
    b) I have slight headache at times
    c) I have moderate headache at times
    d) I have severe headache at times
5. Concentratation
    a) I can concentrate fully with no difficulty
    b) I can concentrate fully with slight difficulty
    c) I concentrate fully with moderate degree of difficulty
    d) I have a lot of difficulty in concentration
6. Work/ Household activities
    a) I can do as much work as I want to
    b) I can only do my usual work, but no more
    c) I can do most of my usual work, but no more
    d) I cannot do my usual work
7. Travel
    a) I can travel as long as I want without discomfort
    b) I can travel as long as I want with discomfort
    c) I can travel short distance with discomfort
    d) I cannot travel at all

8. Sleeping
    a) I never experience sleep disturbance
    b) I sometimes experience sleep disturbance
    c) I often experience sleep disturbance
    d) I experience sleep disturbance always
9. Recreation
    a) I am able to engage in all my recreational activities
    b) I am able to engage in most of the recreational activities with some pain in my neck
    c) I am able to engage in few of my recreational activities because of pain
    d) I limit my recreational activities because of pain in my neck

SCORING

The each sentence will be scored like 1,2,3,4.

SCORING AND INTERPREATION

0-25% No functional disability

26-50 % -Mild functional disability

51 – 75 % Moderate functional disability

>75 % and above severe functional disability

CHAPTER I

INTRODUCTION

Neck disorders remain a common problem in modern industrialized countries. Common neck disorders are degenerative disc disease, cervical spondolysis, herniated disc, rheumatoid arthritis, neck injury such as whiplash, and neck cancer. Neck pain is the most common complaint among working men and women. Neck pain affects about 330 million people globally, whereas in 2010 4.9% of the population has been affected. It is more common in women than in men (Bartleson, J.D. 2012).

Neck pain affects 30–50% of the general population annually. In this 15% of general population experiences chronic neck pain at some point in their lives and 11–14% of the working population annually experience activity limitations due to neck pain. At global point of view the prevalence of neck pain was 4.9%. In 2010, Global Burden of Disease studied 291 conditions out of which neck pain ranked fourth highest in terms of disability as measured by yearly living disability scale, and twenty first in terms of overall burden. Disability-adjusted life years increased from 23.9 million in 1990 to 33.6 million in 2010 (Hoy, D. et al. 2014).

In India, 26 - 71% of the adult population experience episodes of neck pain in their lifetime. Every year more than 50% of adults experience some degree of neck pain due to faulty posture and 60–80% of older adults experience cervical pain due to degenerative changes (Ghufran, M. et al. 2014).

Neck pain is the fourth leading cause of disability. It results in dramatic functional impairments and mobility issues. Most of the cases with neck pain is associated with disability. In Canada, 54 % of the general population experienced neck pain for 6 months, among them 5% were highly disabled due to neck pain (Vijay, S. 2013). Neck pain detrimentally affects an individual's ability to function properly at work and at home. (Dang, C. et al. 2010). The problems of workplace injuries are extremely serious. In India, thirty percentage of computer professionals had neck pain due to work (Vijay, S. 2013).

BACKGROUND OF THE STUDY

Neck pain may originate from any of the structures in the neck which includes muscles, nerves, spine and the cushioning disc. Neck pain may also come from regions near the neck, like shoulder, jaw and upper arms (Kendall, F.P. et al. 2011). Non specific neck pain is the one which is not due to serious disease or neck problem and also there is exact cause for this neck pain is unknown (Speksnijder, C.M. et al.2013).

A common cause of non specific neck pain is muscle strain or tension. The problems of muscle associated with pain in the neck are essentially of two types, one associated with muscle tightness and other with the muscle strain. Every day activities which include bending over a desk for hours, having poor posture while watching TV or reading, sleeping in an uncomfortable position or twisting and turning the neck in a jarring manner while exercising (Kendall, F.P. et al. 2011).

In computer professionals non-specific neck pain is more common because of having poor posture while working with computer, sitting at a computer for prolonged periods of time, placing computer monitor too high or too low. Evidence suggests that more than 87% of computer professionals reported neck pain (Hoobchaak Liz, 2013).

Neck pain can be treated conservatively. Various measures include taking pain killers, maintaining proper body mechanics, and exercise. One of the exercises is isometric exercise, it is a muscle strengthening exercise (Kendall, F.P.et al. 2011). Isometric exercise is found to be effective in contracting the muscle without appreciable change in length also it increases the strength and endurance of muscle thereby reducing the discomfort and stiffness. Isometric contractions should be held against resistance for at least 8 seconds (Hislop, G.J. et al. 2012).

NEED FOR THE STUDY

Shah, A. (2014) studied 970 computer professional aged between 23 to 36 years. He found that 46% of them suffered from neck pain. Also in this study he paid attention to evaluate the effectiveness of various interventions aiming to prevent or alleviate neck pain. Researcher has been found that exercise therapy is beneficial for non-specific neck pain which increases the mobility and strengthens the cervical muscle.

People with neck pain also have weak muscle in the neck, by stretching and strengthening those muscles, more blood flow come to the area to help to repair injury. Isometric exercise ease the neck stiffness with little or no joint movement also it will help to restore and maintain muscle strength to the injured neck. Stronger muscles provide

greater stability to the neck to establish and maintain good posture. Stretching and strengthening exercises need to be performed 1-2 times daily to ease neck stiffness and discomfort (Kietrys, D.M.et al. 2014).

Liyanage, E. et al. (2014) conducted a randomized controlled trial to find if ergonomic intervention with isometric exercise and stretching for neck proves more effective than ergonomics alone for neck pain among computer professionals. 100 female subjects were selected through simple random sampling using lottery method and they were divided into 2 groups. Group I received ergonomic intervention and Group II received ergonomic intervention with stretching and isometric exercise for neck. Group II performed isometric exercise and stretching for every 2 hours during their work for 15 days. Results showed that isometric exercises and stretching along with ergonomic intervention proved more beneficial than ergonomic intervention alone for neck pain among computer professionals.

The investigator during her clinical posting observed that most computer professionals had attended Ortho OPD with the complaints of neck pain. While interacting with them, some ventilated that they work for prolonged period of time without rest and felt more comfortable at 70 degree position while working with computer. Also they felt difficulty in doing day to day activities like watching TV, reading newspaper, driving, travelling. So the investigator felt the need in teaching the isometric exercise in reducing the neck pain and functional disability. This motivated the investigator to do a study on effectiveness of isometric exercise on neck pain and functional disability among computer professionals in selected IT companies.

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of isometric exercise on neck pain and functional disability among computer professionals at selected IT companies, Chennai.

OBJECTIVES

1. To assess the level of neck pain and functional disability among computer professionals before and after intervention.
2. To assess the effectiveness of isometric exercise on neck pain and functional disability among computer professionals.
3. To associate the post interventional level of neck pain and functional disability with demographic and clinical variables among computer professionals.
4. To correlate the post interventional level of neck pain and functional disability among computer professionals.

OPERATIONAL DEFINITIONS

ASSESS

The term assess refers to the process of obtaining information about effectiveness of isometric exercise on reducing neck pain and functional disability among computer professionals by using statistical method.

EFFECTIVENESS

It refers to the extent to which isometric neck exercise has an impact on neck pain and functional disability.

ISOMETRIC EXERCISE

It refers to exercise for the neck which involves contracting neck muscle in a stable position. This includes static flexion, static extension, lateral flexion of neck holding in each position for 8 seconds by restricting movement of head which would be repeated 10 times for duration of 6 minutes.

NECK PAIN

It refers to a subjective, unpleasant sensation in the neck, which will be measured by using Wong – backer faces scale.

FUNCTIONAL DISABILITY

It refers to impairment of physical and mental function due to neck pain which will be measured using modified Vernon neck disability index.

COMPUTER PROFESSIONALS

Computer professionals refer to both men and women who are working with computer for more than 7 hours per day.

HYPOTHESIS

H0: There will be no significant difference between pre and post interventional level of neck pain and functional disability among experimental and control group.

ASSUMPTIONS

- Level of neck pain will be influenced by the functional disability.
- Neck pain and functional disability will be influenced by demographic and clinical variables.

DELIMITATIONS

- The study is limited only to computer professionals.
- Is limited to those with non specific neck pain.

PROJECTED OUTCOME

- The study will help to identify the effectiveness of isometric exercise on neck pain and functional disability among computer professionals.
- The findings of study will help the investigator to make recommendation to implement Isometric exercise as a protocol in IT companies.

CONCEPTUAL FRAME WORK

Conceptual frame work refers to a frame work of preposition for conducting research. A frame work is simply the structure of the research ideas or concepts and how it is put together. So the conceptual frame work is a set of coherent ideas or concepts organized in a manner that makes an investigator easy to communicate with others. Miles and Huber man (1994) defined a framework as a visual or written product, one that explains, either schematically or in narrative form, the key factors, concepts or variables and the presumed relationship among them. Here the conceptual frame work developed for this study is based on Weidenbach helping art of clinical nursing theory adopted with modification.

Ernestine Weidenbach proposed a prescriptive theory for nursing in the year of 1964 which is described as a conceiving of a desired situation and the ways to attain it. It directs action towards an explicit goal. A nurse develops a prescription based on a central purpose and implements it. According to the realities of the situation, it consists of three factors.

Central purpose refers to what the nurse wants to accomplish it which is the overall goal towards which a nurse strives. In this study, the central purpose is to reduce neck pain and functional disability among computer professionals.

Prescription refers to plan of care for a patient. It specifies the nature of the action that will fulfill the nurse's central purpose. Here the prescription is Isometric exercise.

Realities refers to the physiological, emotional and spiritual factors that come into play in situation involving nursing action. The five realities identified by Weidenbach are agent, recipient, goal, means and framework.

- **Agent** is the investigator who collects data from computer professionals.
- **Recipients** are computer professionals who were having non specific neck pain and working at selected IT companies.
- **Goal** is to reduce neck pain and functional disability.
- **Means** is Isometric exercise.
- **Framework** is the selected IT companies in Chennai.

The conceptualization of nursing practice according to this theory consist of three steps as follows

- STEP 1: Identifying the need for help
- STEP 2: Ministering the needed help
- STEP 3: Validating whether the needed help was met

STEP 1: IDENTIFYING THE NEED FOR HELP

In this study, it refers to identification of level of neck pain and functional disability among computer professionals. The level of neck pain was assessed by modified wong-backer faces pain scale and level of functional disability was assessed by modified Vernon neck disability index.

STEP 2: MINISTERING THE NEEDED HELP

It refers to provision of needed help. In this study, the investigator demonstrated the stretching & isometric exercise and the samples were asked to do the same exercise. Isometric exercise consist of 4 steps static flexion, static extension, lateral flexion1 and lateral flexion 2 each step for 8 seconds, repeated 10 times. The total duration of each exercise session was 6 minutes. The samples were instructed to do exercise two times a day for a period of fifteen days.

STEP 3: VALIDATING WHETHER THE NEEDED HELP WAS MET

The nurse validates ministered help. It was accomplished by assessing the post interventional level of neck pain and functional disability on 19^{th} day by using same scales. The intervention could result in either positive or negative outcome. Positive outcome represents the reduction of neck pain and functional disability after intervention and the samples would be encouraged to continue the isometric exercise. The negative outcome represents no improvement in neck pain and functional disability and thus the intervention need to be modified.

CHAPTER II

REVIEW OF LITERATURE

Review of literature is a key step in research process. It refers to an extensive, exhaustive and systematic examination of publications relevant to the research project. The extensive review of literature has been done and it is organized under following headings

PART I

1. General information on isometric exercise.
2. Studies related to neck pain.

PART I

1. Studies related to effectiveness of isometric exercise on neck pain and functional disability.
2. Studies related to effectiveness of isometric exercises on other musculoskeletal conditions.

PART I

1. GENERAL INFORMATION ON ISOMETRIC EXERCISE

Isometric exercise is a static exercise in which a muscle contracts and produces force without an appreciable change in the length of the muscle and without visible joint motion. Although there is no mechanical work done, a measurable amount of tension and force output is produced by the muscle. Sources of resistance for isometric exercise include

holding a weight in a particular position, maintaining a position against the resistance of body weight.

It helps to,

- activate muscle
- develop postural or joint stability
- develop static muscle strength

There are specific isometric exercises to strengthen the neck muscle. It has four steps consisting of,

- Static flexion
- Static extension
- Lateral flexion1
- Lateral flexion 2

In sitting position on the working chair the neck is held in non-moving or stable position. Then place the dominant hand flat on the forehead and firmly push forehead against the right hand. Next step, place the dominant hand behind head, over the occipital region to firmly push the head backwards against the hand. Then place the right hand flat on the right side of the head and firmly push the head against right hand, same exercise to be repeated with the left hand against the left side of the head. In each step, hold hands for 8 seconds and repeat the step for 10 times.

2. STUDIES RELATED TO NECK PAIN

Shah, S.A. & Patel, P.R. (2015) did a cross sectional study to find out the prevalence of neck pain in computer professionals of Ahmadabad City. The age of participants ranged between 23-58 years. Data was collected from 700 subjects via structured mailed questionnaire which included individual variables & work related variables. Results showed that out of 700, 329 subjects reported neck pain. Prevalence of neck pain and functional disability was found to be 47%. The study shows that neck pain is influenced by individual variables and work related variables.

Poonkuzhali, S.K. (2015) conducted a cross sectional study to find out the prevalence of musculoskeletal pain along with the characteristics and severity of the pain among the urban adult women. Six hundred adult women between 35 years to 50 years were selected as samples from Chennai. A semi structured interview schedule was used to record the data related to musculoskeletal pain. The results of the study revealed that the prevalence of musculoskeletal pain was 75.7%. About 40.8 % of the subjects had neck pain, back pain followed by leg pain, joint pain, shoulder pain and hip pain & nearly 50% of the subjects were living with intense pain. 61.4 % of the subjects had difficulty in performing their daily activities.

Hoy, D.G. et al. (2014) systematically reviewed on epidemiology of neck pain from different studies. The estimated 1 year incidence of neck pain from available studies ranged between 10.4% and 21.3% with a higher incidence noted in office and computer workers. The overall prevalence of neck pain in the general population ranged between 0.4%

and 86.8% (mean: 23.1%); point prevalence ranged from 0.4% to 41.5% (mean: 14.4%); and 1 year prevalence ranged from 4.8% to 79.5% (mean: 25.8%). Many environmental and personal factors influence the onset and course of neck pain. Most studies indicated a higher incidence of neck pain among women and an increased risk of developing neck pain until the 35–49-year age group.

Vijay, S. (2013) did a cross sectional study to identify the prevalence of the Work-Related Musculoskeletal Health Disorders (WRMHDs) among the computer professionals working at selected IT companies in India. 300 computer professionals selected from IT companies located at four metropolitan cities in India. A Nordic musculoskeletal questionnaire was used to capture the prevalence with their associated annual disability. 59% of the IT professionals reported that they experienced some form of WRMSDs in the past 12 months. Out of 59%, 30% of the samples experienced neck pain. Low back pain, wrists and hand pain and, the shoulder pain were the next frequently reported symptoms where the annual prevalence was reported as 25%, 14% and 13%.

Kumar, S. et al. (2013) conducted a study to determine the relationship between level of disability, intensity of pain and working hours among computer professionals with neck pain. Seventy computer professionals, with neck pain for minimum of 4 weeks, aged 20-40 years were included in the study. All the subjects were assessed for the intensity of pain and level of disability using visual analogue scale and neck disability index. The results showed a statistically significant positive correlation between level of pain and working hours, level of disability and working hours as well as level of pain and level of disability.

Aggarwal, P. et al. (2013) conducted a study on impact of computer use on prevalence of neck pain and consequent disability. The survey was conducted in various software companies namely Cognizant Technologies, Tech Mahindra and Copper Lab. About 100 subjects, aged 20-30 years were randomly chosen. The results showed that there was significant increase in incidence of neck pain and disability with age and computer usage. The incidence of neck pain was around 81% for men and around 91% for women.

Lindegard agneta, et al. (2012) did a study to investigate whether perceived exertion, perceived comfort and working technique is associated with the incidence of neck and upper extremity symptoms among computer professionals. Self-administered questionnaire was distributed to 853 participants from 46 different work sites. Work-related exposures, individual factors, and symptoms from the neck and upper extremities were assessed. The risk of developing symptoms was recorded. There was an association between low comfort and an increased risk for neck symptoms, but not for shoulder and arm/hand symptoms. The study concluded that there was a strong association between high perceived exertion and the development of neck, shoulder, and arm/hand symptoms. Moreover, there was an association between poor perceived comfort and neck pain.

Sadeghian Farideh, et al. (2012) conducted a longitudinal study to assess the relationship between work-related physical and psychosocial factors and persistent neck and shoulder pains among computer professionals. 182 samples were selected from Shahroud universities northeastern Iran “Cultural and Psychosocial Influences on Disability (CUPID)” questionnaire was used to collect data on demographic characteristics, physical, organizational and psychosocial factors at work, and neck and shoulder symptoms.

The results after a one year follow-up showed that 59.7% of them reported neck pain and 51.3% reported shoulder pain. Significant relationships were found between persistence of neck and shoulder pains and age, gender, and decision latitude at work.

Andrew, S. R. et al. (2012) conducted a cross sectional study to find out the prevalence of neck pain among computer users in both university staff and students. 328 computer users between 19 and 50 years of age of which 110 desktop users and 218 laptop users were distributed questionnaires. The ergonomical evaluation on-site of the participants was also done for the desktop users and various positions used by laptop users were evaluated. The data obtained were analyzed using descriptive statistics. The prevalence rate and the percentage of various positions used by computer users were also analyzed. Finally the team concluded that the prevalence of neck pain among laptop computer users is higher than desktop computer users.

Grover, M. et al. (2011) conducted a survey to find out the musculoskeletal problems of computer users and the preventive measures adopted by those users at Haryana. The sample comprised of 200 computer users ranging from 25-40 years of age, using computer at least for the last one year and for a minimum of 4-6 hours daily. Majority of the respondents (81.5%) reported musculoskeletal problems as they were working long on the computer at a stretch. The magnitude of pain was highest in neck and lower back. Watching the screen at a stretch, holding neck more or less in the same position for a long time, and sitting in poor posture for a long time were the reasons mentioned for pain in different body parts by computer users. Relaxation in terms of rest and exercise were the measures frequently adopted by computer users to reduce pain.

PART II

1. STUDIES RELATED TO EFFECT OF ISOMETRIC EXERCISE ON NECK PAIN AND FUNCTIONAL DISABILITY

Liyanage, E. et al. (2014) conducted a randomized controlled trial to find if ergonomic intervention with isometric exercises and stretching for neck proves more effective than ergonomics alone for neck pain among computer professionals. Subjects were selected through simple random sampling using lottery method. 100 female subjects were selected from IT companies, Bangalore. Group I received ergonomic intervention, Group II received ergonomic intervention with stretching and isometric exercises for neck. The subjects in the experimental group performed isometric exercise and stretching for every 2 hours during their work for 15 days. Results showed that isometric exercises and stretching along with ergonomic intervention proved more beneficial than ergonomic intervention alone for neck pain among computer professionals.

Sowmya, M.V. (2014) did a study to evaluate the efficacy of isometric neck strengthening exercises as compared to dynamic neck strengthening exercises, in the treatment of 60 subjects with chronic neck pain. Non probability sampling technique was used to select the subjects. Patients were randomly divided into two groups, one group performed dynamic neck exercises, the other group of thirty patients performed neck isometric exercises. Both group performed exercise 3 times a week for a period of 3 weeks. Results showed that, isometric exercise was much more effective method than dynamic neck exercises in patients with chronic neck pain.

Khan, M. et al. (2014) conducted a randomized control trial to evaluate the effectiveness of isometric exercises as compared to general exercises in chronic non specific neck pain. A total of 68 patients with chronic non-specific neck pain were recruited from Alain Poly Clinic and Institute of Physical Medicine & Rehabilitation, Dow University of Health Sciences, Karachi. Simple randomization method was used to assign participants in isometric exercise and in general exercise group. Patients in both groups received 3 supervised exercise sessions per week for 12 weeks. The study concluded that both interventions are effective in the treatment of chronic non-specific neck pain, however isometric exercises are clinically more effective than general exercises.

Salo, P.K. et al. (2010) did a one year follow up study to evaluate the effect of muscle strength training on health-related quality of life (HRQOL) in females with chronic neck pain. One hundred eighty female office workers, 25 to 53 years of age, with chronic neck pain were randomized to a strength training group (n = 60), endurance training group (n = 60). The strength training group performed high-intensity isometric neck strengthening exercises with an elastic band while the endurance training group performed lighter dynamic neck muscle training. Results showed that one year of either muscle strength or endurance training seemed to moderately enhance the HRQOL.

Thomas, T.W. et al. (2010**)** conducted a randomized controlled study to evaluate the efficacy of a neck exercise program in patients with chronic neck pain. A total of 145 patients were randomly allocated into an exercise (Experimental) and a non exercise (control) group. Patients in the exercise group had undergone an exercise program with activation of the deep neck muscles and dynamic strengthening of the neck muscles for 6 weeks. Patients in the control group were given infrared irradiation and neck care advice. Results revealed that the exercise group had a significant reduction in neck pain and functional disability.

2. STUDIES RELATED TO EFFECTIVENESS OF ISOMETRIC EXERCISES ON OTHER MUSCULOSKELETAL CONDITIONS

Rhyu, H.S. et al., (2015) conducted a study to evaluate the effectiveness on types of isometric exercise on low back pain. 23-25 years aged men were selected as samples. Subjects were divided into 3 groups – low back pain control group, low back pain mat exercise group, and low back pain I-Zer exercise group. Visual analogue scale and electromyography were used to evaluate the degree of pain and the muscle activity in low back pain patients. Experimental group performed exercise one set a time, 3 times per week for 6 weeks. Results showed that patients who had performed isometric exercise had positive effect in reducing pain and increasing muscle activity.

Amany. S. (2014) conducted a quasi experimental study to evaluate the effectiveness of acupressure versus isometric exercise on pain, stiffness, and physical function in knee osteoarthritis female patients. Samples were divided into three groups of 30 patients each isometric exercise, acupressure, and control. Data were collected by an interview form and the Western Ontario and McMaster Universities Osteoarthritis index scale. The study revealed that after the intervention, pain decreased in the two intervention groups compared to the control group. The scores of stiffness and impaired physical function were significantly lower in the isometric group compared to the other two groups.

Anwer, S & Alghdir. A. (2014) did a randomized controlled study to evaluate the effect of isometric quadriceps exercise on muscle strength, pain, and function in patients with knee osteoarthritis. 60 patients with osteoarthritis, age ranging from 40-65 years were selected as samples. They were randomly assigned into two groups, experimental group performed isometric exercises for 5 weeks whereas the control group received ultrasound therapy around knee joint as per the patient's requirement for 5 weeks. Results showed that isometric quadriceps exercise brought significant improvements in all the parameters after the 5-week training programme.

CHAPTER-III

METHODOLOGY

The aim of the study was to assess the effectiveness of isometric exercise on neck pain and functional disability among computer professionals. This chapter includes research approach, design, settings, population, and sample, criteria for selection of sample, sample size, sampling technique, data collection method and tool, validity of tool, pilot study, data collection procedure and plan for data analysis.

SCHEMATIC REPRESENTATION OF METHODOLOGY

RESEARCH APPROACH

Experimental in nature

RESEARCH DESIGN

Quasi experimental design

SETTING OF THE STUDY

KKM SOFT (P) LTD, eSales Technologies India Pvt. Ltd, Chennai

TARGET POPULATION

Computer professionals with neck pain and functional disability

SAMPLES

Computer professionals who fulfilled the inclusion criteria

SAMPLING TECHNIQUE

Non Probability Purposive sampling technique

SAMPLE SIZE

60 computer professionals (Experimental-30 and Control-30)

DATA COLLECTION METHOD &TOOL

Self reporting method: Self administered questionnaire

DATA ANALYSIS

Descriptive (frequency, mean, SD) and inferential statistics (t test, Chi square, Karl pearson correlation coefficient)

FIGURE NO: 2 Schematic representation of methodology

RESEARCH APPROACH

The research approach used in this study was experimental in nature.

RESEARCH DESIGN

Quasi experimental research design was chosen for this study

Group	**O_1**	**×**	**O_2**
Experimental	Pre assessment of Neck pain and functional disability	Isometric exercise	Post assessment of neck pain and functional disability
Control	Pre assessment of Neck pain and functional disability	__	Post assessment of neck pain and functional disability

O_1= Experimental group, O_2= control group, ×= Intervention

VARIABLES OF THE STUDY

Independent variable

The independent variable in this study was Isometric exercise.

Dependent variable

The dependent variables of this study are neck pain and functional disability among computer professionals.

SETTING OF THE STUDY

PILOT STUDY

Lashron technologies, it is an IT company with total strength of 215 employees functioning at Parrys, Chennai.

MAIN STUDY

Setting-I

KKM SOFT (P) LTD,

It is an IT company with a total strength of 710 employees functioning at Guindy, Chennai.

Setting-II

eSales Technologies India Pvt. Ltd,

It is an IT company with a total strength of 680 employees functioning at Teynampet, Chennai.

POPULATION OF THE STUDY

The population for this study consisted of male and female computer professionals who had complaints of neck pain and functional disability working in above mentioned IT Companies.

SAMPLE

IT Professionals both male and female who fulfilled the inclusion criteria were selected as sample.

CRITERIA FOR THE SELECTION OF SAMPLE

INCLUSION CRITERIA

Samples with neck pain and functional disability who were,

- in the age group of 21-40 yrs.
- suffering from non specific neck pain less than 6 months.
- having mild and moderate level of neck pain and functional disability.
- willing to participate and knows Tamil and English.

EXCLUSION CRITERIA

Samples who were,

- having severe level of neck pain and functional disability.
- suffering from osteoarthritis, recent fracture, cervical spondolysis.
- undergoing complementary therapy along with medical management for osteoarthritis, cervical spondolysis.

SAMPLE SIZE

The sample size was 60. The samples were selected from two IT companies, from eSales Technologies India Pvt. Ltd, out of 710 employees 30 employees were selected as a samples for experimental group and from KKM SOFT (P) LTD out of 680 employees 30 employees were selected as a samples for control group. The samples were distributed as follows

Settings	Total sample size	Experimental group	Control group
eSales Technologies India Pvt. Ltd	30	30	—
KKM SOFT (P) LTD	30	—	30

SAMPLING TECHNIQUE

The sampling technique used in this study was non probability purposive sampling.

TOOL FOR DATA COLLECTION

Self reporting method was used to collect the data. The self administered questionnaire consisted of the following,

1. Structured items and questions for collection of demographic and clinical data
2. Modified Wong Baker FACES pain assessment scale(Wong, B., 1981)
3. Modified Vernon neck disability index(Vernon.1989)

DESCRIPTION OF DATA COLLECTION TOOL

PART: A

It consisted of structured questions & items to collect demographic data of the computer professionals such as age, sex, marital status, religion, educational status, monthly income, years of experience, dietary habit, type of family and habits.

PART: B

It consisted of structured questions to collect clinical data of computer professionals such as type and duration of neck pain, working and travelling hours, mode of transport, mobile use, appropriate posture, rest period, and self care measures.

PART: C

ASSESSMENT OF LEVEL OF NECK PAIN

Modified Wong Baker FACES pain assessment scale (Wong, B., 1981) was used. It is a visual analog scale combined with numerical scores. The scale shows a five faces ranging from a “happy face” at “0” at one end, and “hurts worst” with a score of “10” at the other end. Each face is placed at the interval of two score in the scale.

PART: D

ASSESSMENT OF LEVEL OF FUNCTIONAL DISABILITY

Vernon neck disability index (Vernon.1989) was used after modification. It is a standardized tool consists of 9 categories such as personal care, lifting, reading, headache, concentration, work/ household activities, travel, sleeping and recreation.

SCORING AND INTERPRETATION

1) MODIFIED WONG BAKER FACES PAIN ASSESSMENT SCALE

The scale was showed to the samples to assess the level of neck pain. When the samples selected "Faces", appropriate score was given. When the samples expressed the faces in-between two faces, the median score was given. The total score is 10

The level of neck pain was graded as follows:

Level of Neck pain	Grading
No pain	0
Mild pain	1-3
Moderate pain	4-6
Severe pain	7-10

2) MODIFIED VERNON NECK DISABILITY INDEX

It consisted of 9 categories with 4 options. For each category, the maximum score is "4" and the minimum score is "1". Overall score is 36.

For each sample the percentage was calculated as follows,

$$\text{Percentage} = \frac{\textit{Obtained score}}{\textit{Total score}} \times 100$$

Based on the percentage, the sample's functional disability score was interpreted as follows:

Level of functional disability	**Grading**
No functional disability	0-25%
Mild functional disability	26-50%
Moderate functional disability	51-75%
Severe functional disability	>75%

VALIDITY OF THE TOOL

The tool used in this study was validated by an Orthopaedician and Nursing experts in the field of medical surgical nursing

RELIABILITY OF TOOL

The reliability of the tool was calculated. Inter-rater method was used for Modified Wong Baker FACES pain assessment scale, its r –value is 0.85 and spilt half method was used for modified Vernon neck disability index, its r –value is 0.84. These correlation coefficients are very high and it is good tool to assess the effectiveness of isometric exercise on neck pain and functional disability

PROTOCOL FOR INTERVENTION

Samples were taught to do neck stretching.

Neck stretching: It is used to stretch and relax the neck muscles, and the total duration of exercise is 5 minutes. Samples were instructed to sit straight and maintain the head in neutral position and instructed to do the following steps:

- **Neck flexion:** Samples were instructed to bring the head forward and attempt to touch the chin to the chest until a stretch is felt in the back of the neck.
- **Neck extension:** Gently bend the head backward until a stretch is felt in the back of the neck.
- **Right and left lateral flexion:** Gently bend the neck to right side to touch the ear to shoulder then repeat the same step on left side.

- **Rotation:** Turn the head to the right as far as possible, try to bring the chin over the shoulders, and then repeat the same step on another side. Hold in this position for about 12 seconds, rest for up to 3 seconds, and then repeat 5 times.

Then samples were taught isometric neck exercise.

Isometric exercise is a neck strengthening exercise. It is used to strengthen the neck muscle. The duration of exercise is 6 minutes. The samples were instructed to sit straight and maintain the head in neutral position and the samples were instructed to do the following steps, while they were asked to press firmly and not to tip the head.

- **Step – 1 Static flexion**

  Samples were instructed to put the heels of both hands against forehead just above eyebrows. Then press hands against forehead at the same time press head against the hands. Hold this position for about 5 seconds, rest for up to 3 seconds, and then repeat 10 times.

- **Step – 2 Static Extension**

  Samples were instructed to put one hand over the other hand and place their hands against the lower back of the head then press hands against head at the same time press head straight back against the hands. Hold this position for about 5 seconds, rest for up to 3 seconds, and then repeat 10 times.

- **Step – 3 Lateral flexion 1**

  Samples were instructed to place right hand against the right side of head above the ear. Press against the side of head with hand, also press head back against the hand. Hold this position for about 5 seconds, rest for up to 3 seconds, and then repeat 10 times.

- **Step – 4 Lateral flexion 2**

  Samples were instructed to place left hand against the left side of head above the ear. Press against the side of head with hand, also press head back against the hand. Hold this position for about 5 seconds, rest for up to 3 seconds, and then repeat 10 times.

HUMAN RIGHTS AND ETHICAL CONSIDERATION

The study was approved by the ethical committee constituted by the college. Permission was obtained from the head of the institutions to conduct the study. Informed consent was obtained from the participants who participated in this study.

PILOT STUDY

Pilot study was conducted in Lashron technologies Chennai, from 14.05.15 to 19.05.15 after obtaining permission from the project manager. Totally 6 computer professionals who fulfilled the inclusion criteria were selected as samples, in that 3 samples were selected for experimental group and 3 samples for control group. Self administered

questionnaire was given to collect demographic data, clinical data, level of neck pain, and level of functional disability. Isometric neck exercise was demonstrated to the experimental group by the investigator on day 1, then the samples did exercise for six consecutive days for two times a day. The post interventional level of neck pain and functional disability was assessed on the seventh day for both experimental and control group using the same tool.

PILOT STUDY RECOMMENDATION

There is no practical difficulty experienced in the sample selection. While collecting data for pilot study the investigator observed that most of the samples with neck pain were in the age group of 21-25 years. Based on the findings of the pilot study, the following suggestion was made by the research committee member.

In part A

Q.No:1 Age in years

a) 26 - 30years
b) 31 - 35years
c) 36 - 40years
d) 41 – 45 years

The above responses were modified as

Age in years

a) 21-25 years
b) 26 - 30years
c) 31 - 35years
d) 36 - 40years

DATA COLLECTION PROCEDURE

Permission was obtained from company manager of eSales Technologies India Pvt. Ltd and KKM SOFT (P) LTD Chennai. The data for main study was collected from 09.06.15 to 28.06.15 between 9am to 5 pm. The employees, who were in duty, were asked to assemble in a common room during their break time. Employees with neck pain were identified by oral confirmation and pre test questionnaire was distributed to all employees. Computer professionals took 20 minutes to complete the tool. After obtaining data, computer professionals who fulfilled the inclusion criteria at eSales Technologies India Pvt. Ltd were selected as samples for experimental group and those who fulfilled the inclusion criteria at KKM SOFT (P) LTD were selected as samples for control group.

After the self introduction, the purpose of study was explained and informed consent was obtained from samples. The pre interventional level of neck pain and functional disability was assessed for both samples in experimental and control group. For experimental group, after pre assessment, active neck stretching exercise was demonstrated by the investigator on day one, then the samples were advised to follow the exercise for 3 days, two times a day. Then Isometric exercise was demonstrated by the investigator on day 4, then the samples continued doing exercise for 15 consecutive days for two times a day. The post interventional level of neck pain and functional disability was assessed on 19^{th} day by using the same scale. The control group was also observed for 18 days. The post interventional level of neck pain and functional disability was assessed on 19^{th} day.

PLAN FOR DATA ANALYSIS

DESCRIPTIVE ANALYSIS

- Frequency and percentage distribution was used to describe demographic and clinical variables of the samples with neck pain and functional disability.
- Mean and standard deviation was used to assess the pre and post interventional level of neck pain and functional disability.

INFERENTIAL STATISTICS

- Paired “t” test and Independent “t” test was used to compare the level of neck pain and functional disability of experimental and control group.
- Chi square test was used to associate the post interventional level of neck pain and functional disability with selected demographic variable and clinical variable in the experimental group.
- Coefficient correlation was used to correlate the post test level of neck pain and functional disability.

CHAPTER - IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis of the data collected from the selected 60 samples. The aim of the study was to assess the effectiveness of Isometric exercise on neck pain and functional disability among computer professionals working in selected IT companies, Chennai. Descriptive and inferential statistics were used to analyze the data.

The data obtained was classified and presented under the following sections.

SECTION I

Frequency and percentage distribution of the demographic data of the samples with neck pain and functional disability

SECTION II

Frequency and percentage distribution of the clinical data of the samples with neck pain and functional disability

SECTION III

Assessment of level of neck pain and functional disability of the samples in experimental and control group.

1. Frequency and percentage distribution of level of neck pain among computer professionals

2. Frequency and percentage distribution of the level of functional disability among computer professionals

SECTION IV

Comparison of level of neck pain and functional disability among experimental and Control group

SECTION V

Association of post interventional level of neck pain and functional disability with selected demographic and clinical variables of experimental group

SECTION VI

Correlation of post interventional level of neck pain and functional disability among computer professionals

SECTION I

FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE DEMOGRAPHIC VARIABLES OF THE SAMPLES.

Table 1.1 Frequency and percentage distribution of the demographic variables of the samples based on age, gender and marital status.

n=60 O_1=30, O_2=30

S. No	Demographic variables	Group			
		Experimental		Control	
		F	P (%)	F	P (%)
1	**Age**				
	a) 21-25 year	11	36.7%	10	33.3%
	b) 26 - 30years	15	50.0%	15	50.0%
	c) 31 - 35years	4	13.3%	5	16.7%
2	**Gender**				
	a) Male	18	60.0%	19	63.3%
	b) Female	12	40.0%	11	36.7%
3	**Marital status**				
	a) Single	14	46.7%	17	56.7%
	b) Married	16	53.3%	13	43.3%

O_1=Experimental group O_2= Control group

Table1.1shows that in the experimental group, fifteen (50.0%) samples were in the age group of 26-30 years. Eighteen samples (60.0%) were male. Sixteen (53.3%) samples were married. In control group, fifteen (50.0%) samples were aged between 26-30 years. Nineteen (63.3%) of them were male. Seventeen samples (56.7%) were single.

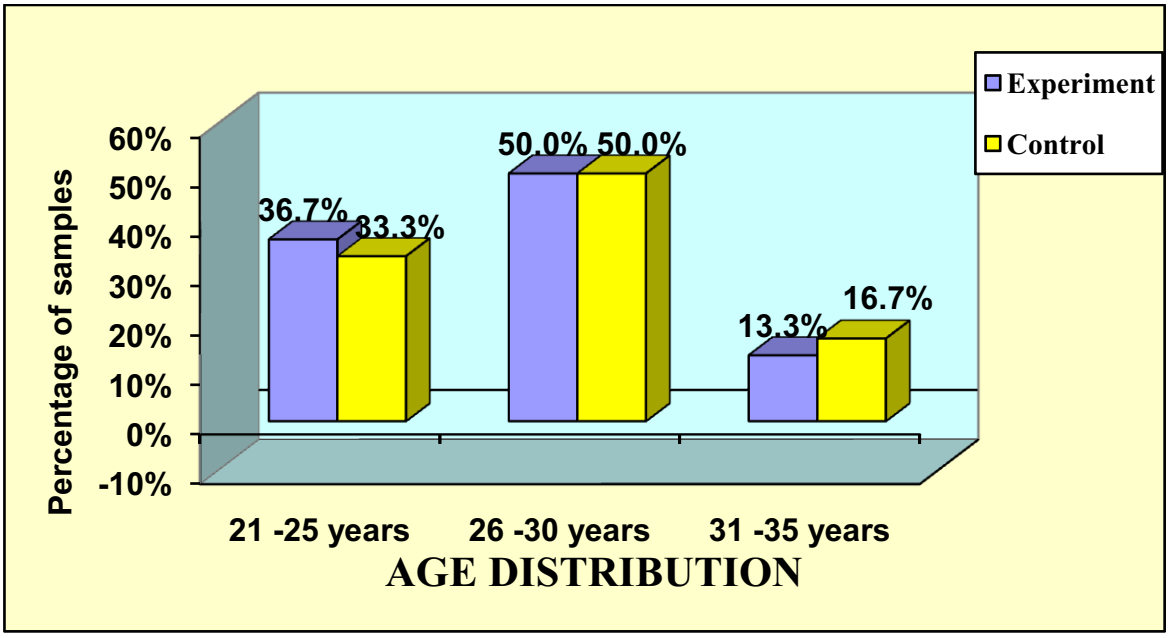


FIGURE NO: 3 Percentage distribution of the samples based on age.

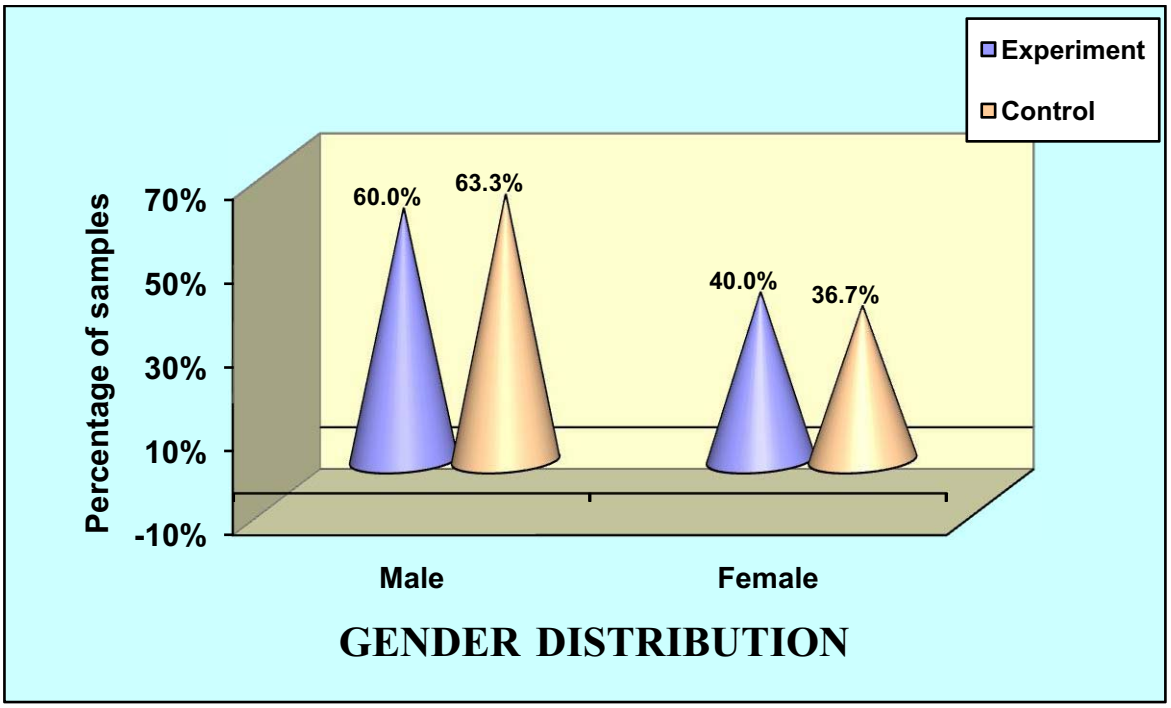


FIGURE NO: 4 Percentage distribution of the samples based on gender.

Table 1.2 Frequency and percentage distribution of the demographic variables of the samples based on religion, educational status and monthly income.

n=60 O_1=30, O_2=30

S. No.	Demographic variables	Group			
		Experimental		Control	
		F	P (%)	F	P (%)
4	**Religion**				
	a) Hindu	22	73.3%	20	66.7%
	b) Christian	4	13.3%	6	20.0 %
	c) Muslim	4	13.3%	4	13.3 %
5	**Education status**				
	a) Diploma in computer	1	3.3%	1	3.3%
	b) Graduate	17	56.7%	18	60.0%
	c) Post graduate	12	40.0%	11	36.7%
6	**Monthly income**				
	a) Rs.10,000- 15,000	8	26.7%	6	20.0%
	b) Rs.16,000- 20,000	12	40.0%	14	46.7%
	c) Rs.21,000- 26,000	6	20.0%	8	26.7%
	d) Rs.25,000 and above	4	13.3%	2	6.6%

O_1=Experimental group O_2= Control group

Table 1.2 reveals that in the experimental group, majority, 22 (73.3%) samples belonged to Hindu religion. Seventeen (56.7%) of them were graduates. Majority, 12 (40.0%) samples monthly income was Rs.16, 000-20,000. In the control group, majority (66.7%) of them belonged to Hindu religion. Eighteen (60.0%) of them were graduates. Majority (46.7%) of the samples monthly income was Rs.16, 000 -20,000.

Table 1.3 Frequency and percentage distribution of the demographic variables of the samples based on years of working experience, dietary habit, type of family and habits

n=60 O_1=30, O_2=30

S. No.	Demographic variables	Group			
		Experimental		Control	
		F	P (%)	F	P (%)
7	**Years of working experience**				
	a) 1-2 years	9	30.0%	7	23.3%
	b) 2-3 years	8	26.7%	7	23.3%
	c) 3-4 years	7	23.3%	8	26.7%
	d) 4-5 years	6	20.0%	8	26.7%
8	**Dietary habit**				
	a) Vegetarian	5	16.7%	6	20.0%
	b) Non-vegetarian	25	83.3%	24	80.0%
9	**Type of family**				
	a) Nuclear family	17	56.7%	15	50.0%
	b) Joint family	13	43.3%	15	50.0%
10	**Habits**				
	a) Alcoholism	5	16.7%	4	13.3%
	b) Smoking	7	23.3%	13	43.3%
	c) None	18	60.0%	13	43.3%

O_1=Experimental group O_2= Control group

Table 1.3 shows that in the experimental group, nine (30.0%) of them were having working experience of 1-2 years. Majority (83.3%) of them, were non-vegetarian. Seventeen (56.7%) samples belong to nuclear family. Seven (23.3%) of them were smokers. In the control group, eight (26.7%) samples were having working experience of 3-4years and 4-5 years, majority (80.0%) of them were non-vegetarian. Fifteen (50.0%) samples belong to nuclear family and 15 (50.0%) samples belong to joint family. Thirteen (43.3%) of them had the habit of smoking..

SECTION – II

FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE CLINICAL VARIABLES OF THE SAMPLES.

Table 2.1: Frequency and percentage distribution of the clinical variables of the samples based on duration of neck pain, and type of neck pain.

n=60 O_1=30, O_2=30

S. No.	Clinical variables	Group			
		Experimental		Control	
		F	P (%)	F	P (%)
1	**Do you have neck pain?** a) yes	30	100%	30	100%
2	**How long have you been suffering with neck pain?** a) Less than a month b) 1-< 3 months c) 3-< 6 months	 9 11 10	 30.0% 36.7% 33.3%	 7 11 12	 23.3% 36.7% 40.0%
3	**What type of neck pain do you experience?** a) Tingling, Pricking b) Pain of tight touch c) Hot or burning d) Electrical shock	 12 7 5 6	 40.0% 23.3% 16.7% 20.0%	 13 8 4 5	 43.3% 26.7% 13.3% 16.7%

O_1=Experimental group O_2= Control group

Table 2.1 shows that in both group all of them were having neck pain. In the experimental group eleven (36.7%) of them had neck pain for 1-<3 months and 10 (33.3%) samples had neck pain for 3-<6 months. Majority (40.0%) of samples were experiencing tingling and pricking type of pain. In the control group, twelve (40.0%) samples had neck pain for 3-<6 months and eleven (36.7%) samples had neck pain for 1-<3 months. Majority (43.3%) of the samples were experiencing tingling and pricking type of pain.

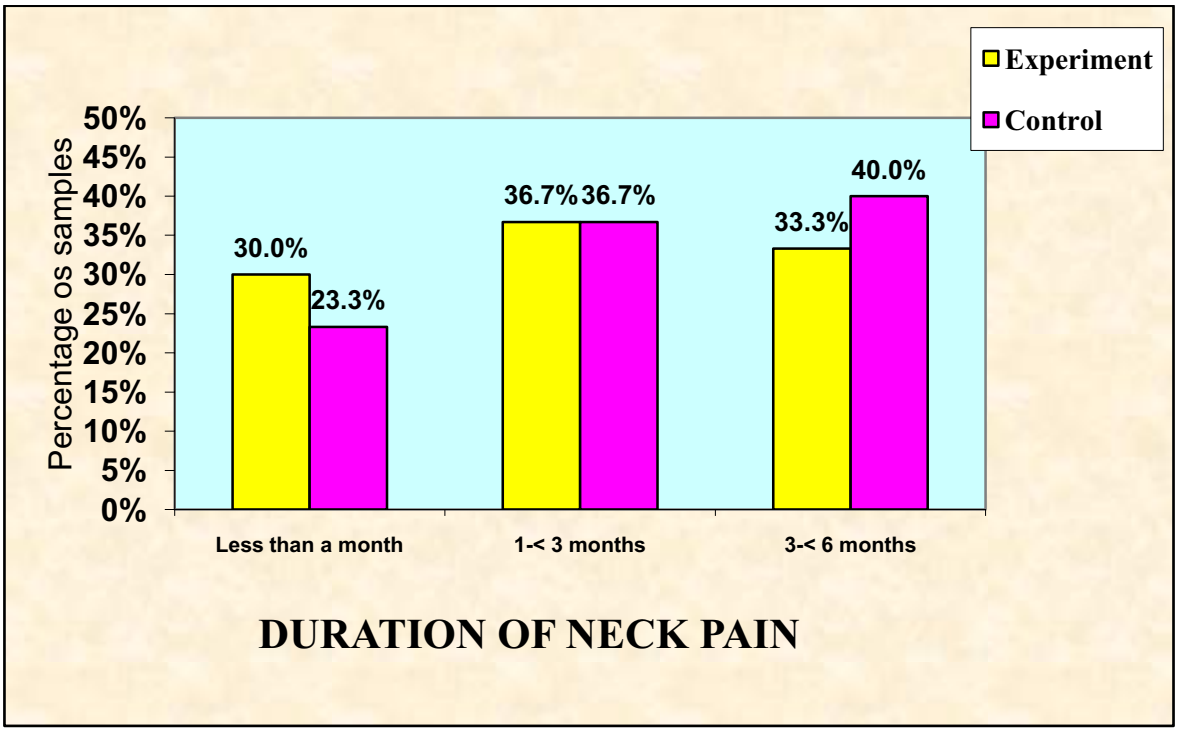


FIGURE NO: 5 Percentage distribution of the samples based on duration of neck pain.

Table 2.2: Frequency and percentage distribution of the clinical variables of the samples based on working hours, mode of transport and travelling hours

n=60 O_1=30, O_2=30

S.No.	Clinical variables	Group			
		Experimental		Control	
		F	P (%)	F	P (%)
4	**How long do you work with computer per day?**				
	a) 8 hours	9	30.0%	11	36.7%
	b) 8-10 hours	15	50.0%	13	43.3%
	c) > 10 hours	6	20.0%	6	20.0%
5	**How do you commute to work place?**				
	a) By bus	5	16.7%	6	20.0%
	b) By two wheeler	13	43.3%	14	46.7%
	c) By car	4	13.3%	4	13.3%
	d) By train	8	26.7%	6	20.0%
6	**How many hours do you travel per day?**				
	a) 1-2 hours	19	63.3%	15	50.0%
	b) 2-3 hours	9	30.0%	11	36.7%
	c) <3 hours	2	6.7%	4	13.3%

O_1=Experimental group O_2= Control group

Table 2.2 shows that in the experimental group, fifteen (50.0%) samples were working for 8-10 hours per day with the computer. Majority (43.3%) of the samples were using two wheeler to commute to work place. Nineteen (63.3%) of them were travelling for 1-2 hours per day. In the control group, majority (43.3%) of the samples were working for 8-10 hours per day with the computer. Fourteen (46.7%) of them were using two wheeler to commute to work place. Majority (50.0%) of them were travelling for 1-2 hours per day.

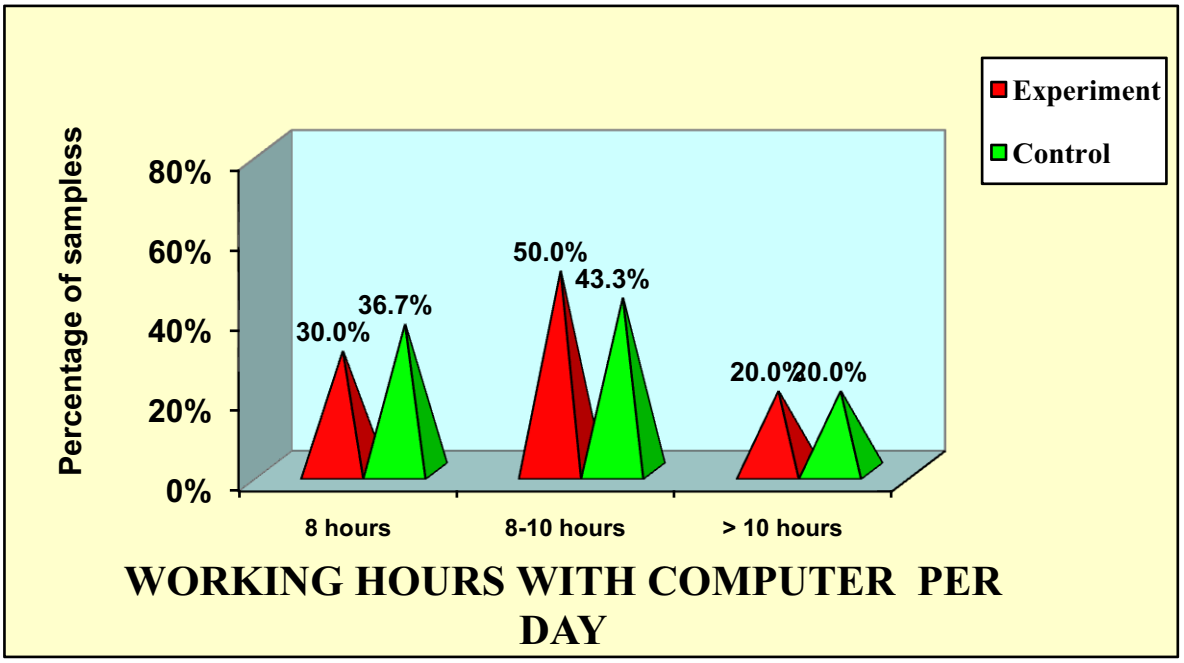


FIGURE NO: 6 Percentage distribution of the samples based on working hours with computer.

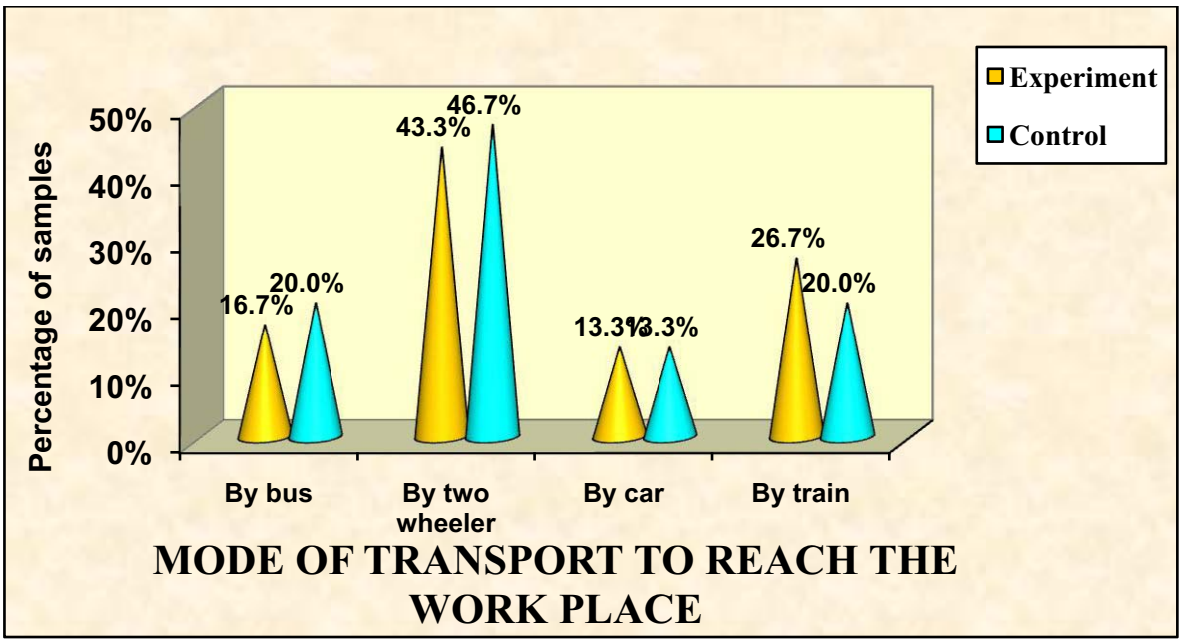


FIGURE NO: 7 Percentage distribution of the samples based on mode of transport to reach work place.

Table 2.3: Frequency and percentage distribution of the clinical variables of the samples based on duration of mobile use and appropriate posture.

n=60 O_1=30, O_2=30

S. No	Clinical variables	Group			
		Experimental		Control	
		F	P (%)	F	P (%)
7	**What is the duration of cell phone use per day?**				
	a)2-4 hours	6	20.0%	6	20.0%
	b)4-6 hours	22	73.3%	20	66.7%
	c)6-8 hours	2	6.7%	4	13.3%
8	**Which of the following position do you adapt regularly while working with computer?**				
	a)	2	6.7%	2	6.7%
	b)	15	50.0%	16	53.3%
	c)	5	16.6%	6	20.0%
	d)	8	26.7%	6	20.0%

O_1=Experimental group O_2= Control group

Table 2.3 shows that in the experimental group, majority, 22 (73.3%) samples were using cell phone for 4-6 hours per day. Majority (50.0%) of samples were adapting 70 degree sitting position while working with computer. In the control group, twenty (66.7%) samples were using cell phone for 4-6 hours per day. Majority (53.3%) of the samples were adapting 70 degree sitting position while working with computer.

Table 2.4: Frequency and percentage distribution of the clinical variables of the samples based on rest period, and self care measures.

n=60 O_1=30, O_2=30

S. No.	Clinical variables	Group			
		Experimental		Control	
		F	P (%)	F	P (%)
9	**Do you utilize rest hours in between work?**				
	a) yes	9	30.0%	8	26.7%
	b) no	21	70.0%	22	73.3%
	If yes specify the position you adopt regularly during rest hours				
	1)	3	33.3%	2	25.0%
	2)	4	44.4%	4	50.0%
	3)	2	22.2%	2	25.0%
10	**Do you take any self care measures for neck pain?**				
	a) yes				
	b) no	30	100%	30	100%
	if yes specify ----------				

O_1=Experimental group O_2= Control group

Table 2.3 reveals that in the experimental group, twenty one (70.0%) samples were not utilizing rest hours in between work. In the control group, twenty two (73.3%) samples were not utilizing rest hours in between work. In both groups, none of them had taken self care measures for neck pain.

SECTION III

ASSESSMENT OF LEVEL OF NECK PAIN AND FUNCTIONAL DISABILITY FOR EXPERIMENTAL AND CONTROL GROUP.

Table: 3.1 Frequency and percentage distribution of level of neck pain experienced by the samples in experimental and control group.

n=60 O_1=30, O_2=30

Group		Level of neck pain							
		No pain		Mild pain		Moderate pain		Severe pain	
		F	P (%)	F	P (%)	F	P (%)	F	P (%)
Experimental	Pre test	0	0.0	12	40.0	18	60.0	0	0.0
	Post test	10	33.3	20	66.6	0	0.0	0	0.0
Control	Pre test	0	0.0	13	43.3	17	56.7	0	0.0
	Post test	0	0.0	15	50.0	15	50.0	0	0.0

O_1=Experimental group O_2= Control group

Table: 3.1 shows that in the experimental group, majority (60.0%) of the samples had moderate level of neck pain and 40.0% of them had mild level of neck pain in pre test. In post test 66.7% of the samples had mild level of neck pain and 33.3% of them had no pain. Whereas in the control group, majority (56.7%) of the samples had moderate level of neck pain and 43.3% of them had mild level of neck pain in pre test. In post test, 50% of the samples had moderate level of neck pain and 50.0% of them had mild level of neck pain.

Table: 3.2 Frequency and percentage distribution of level of functional disability experienced by the samples in experimental and control group.

n=60 O_1=30, O_2=30

Group		Level of functional disability							
		No functional disability		Mild functional disability		Moderate functional disability		Severe functional disability	
		F	P (%)	F	P (%)	F	P (%)	F	P (%)
Experimental	Pre test	0	0.0	19	63.3	11	36.7	0	0.0
	Post test	12	40.0	18	60.0	0	0.0	0	0.0
Control	Pre test	0	0.0	20	66.7	10	33.3	0	0.0
	Post test	0	0.0	20	66.7	10	33.3	0	0.0

O_1=Experimental group O_2= Control group

Table: 3.2 shows that in experimental group, majority (63.3%) of the samples had mild functional disability and 36.7% of them had moderate functional disability in pre test. The post test results showed that majority (60.0%) of the samples had mild functional disability and 40.0% of them had no functional disability. Whereas in the control group, in pre test and post test twenty (66.7%) samples had mild functional disability and 10 (33.3%) of them had moderate functional disability.

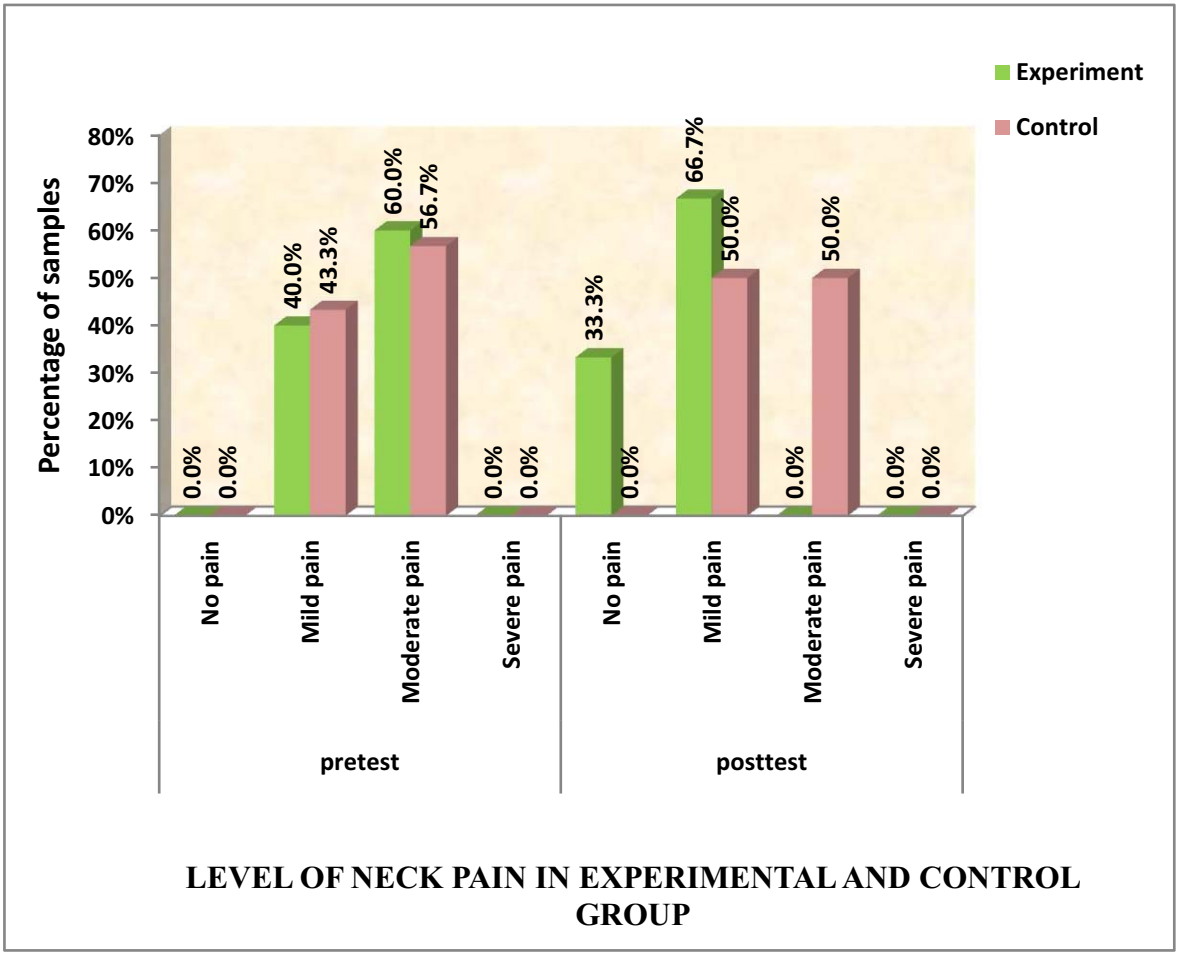


FIGURE NO: 8 Percentage distribution of pre and post test level of neck pain of samples of experimental and control group.

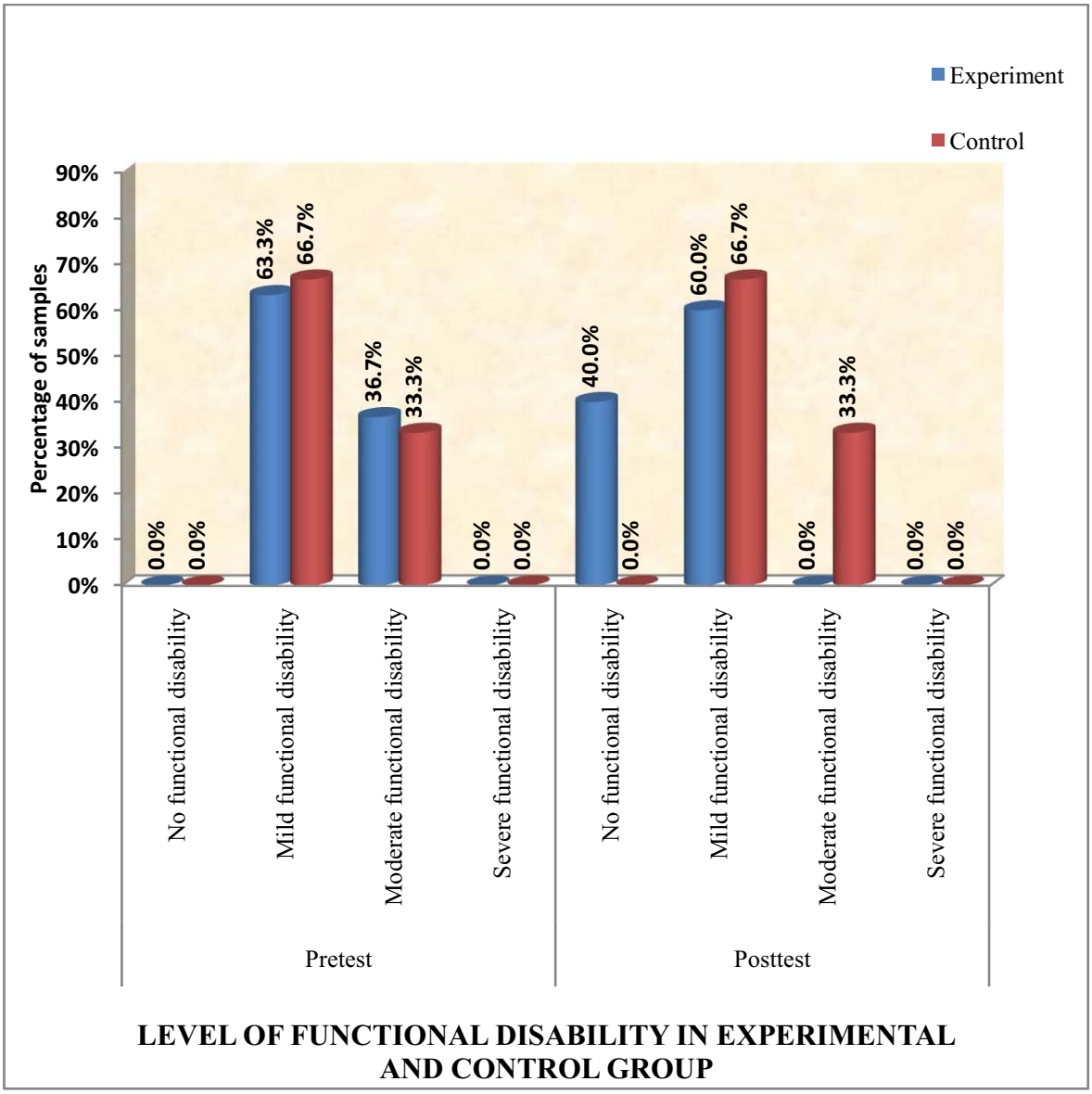


FIGURE NO: 9 Percentage distribution of pre and post test level of functional disability of samples of experimental and control group.

SECTION IV

COMPARISON OF LEVEL OF NECK PAIN AND FUNCTIONAL DISABILITY AMONG COMPUTER PROFESSIONALS.

Table 4.1: Pre and post test level of neck pain and functional disability among samples in experimental and control group.

Variable	Group	Pretest		posttest		Mean difference	Paired t-test
		Mean	SD	Mean	SD		
Neck pain	Experimental	3.83	0.87	1.10	0.99	2.73	t=28.74 p=0.001*** significant
	Control	3.63	0.62	3.53	0.68	0.10	t=1.25 p=0.22 not significant
Functional difficulty	Experimental	16.97	2.34	11.97	2.52	5.00	t=17.38 p=0.001*** significant
	Control	16.67	2.17	16.50	2.27	0.17	t=1.41 p=0.17 not significant

(* ** denotes very high significant at 1% level)

Table: 4.1 shows that in the experimental group, the pre test mean neck pain score was 3.83 with the standard deviation of 0.87. Whereas in the post test, the mean neck pain score was 1.10 with the standard deviation of 0.99. In control group, the pre test mean neck pain score was 3.63 with the standard deviation of 0.62 and in post test the mean neck pain score was 3.53 with the standard deviation of 0.68.

In relation to functional disability in the experimental group, the pre test mean functional disability score was 16.97 with the standard deviation of 2.34. Whereas in post test, the mean functional disability score was 11.97 with the standard deviation of 2.52. In control group, the pre test mean functional disability score was 16.67 with the standard deviation of 2.17 and in post test, the mean functional disability score was16.50 with the standard deviation of 2.27.

In experimental group, the difference between pre and post test score for neck pain and functional disability among computer professionals was statistically significant at (P= 0.001) level.

Table 4.2: Mean and standard deviation score of neck pain and functional disability among samples in experimental and control group.

n=60 O_1=30, O_2=30

		Experimental group		Control group		Mean difference	Student independent t-test
		Mean	**SD**	**Mean**	**SD**		
Neck pain	pretest	3.83	0.87	3.63	0.62	0.20	t=1.02 p=0.32 not significant
	posttest	1.10	0.99	3.53	0.68	2.43	***t=11.05 p=0.001 ***significant***
Functional difficulty	pretest	16.97	2.34	16.67	2.17	0.30	t=0.51 p=0.60 not significant
	posttest	11.97	2.52	16.50	2.27	4.53	***t=7.31 p=0.001 ***significant***

(* denotes significant at 1% level)**

Table 4.2 shows that in the experimental group, the pre test mean neck pain score was 3.83 with the standard deviation of 0.87. In control group, the pre test mean neck pain score was 3.63 with the standard deviation of 0.62. In the post test experimental group, mean neck pain score was 1.10 with the standard deviation of 0.99. Whereas in the control group, the post test mean neck pain score was 3.53 with the standard deviation of 0.68.

In relation to functional disability in the experimental group, the pre test mean score was 16.97 with the standard deviation of 2.34. In control group, the pre test mean score was 16.67 with the standard deviation of 2.17. In post test, the mean score was 11.97 with the standard deviation of 2.52. Whereas in the control group the mean score was16.50 with the standard deviation of 2.27 in post test.

On comparison of mean score of the level of neck pain and functional disability among computer professionals in pre and post test revealed that there was a statistically significant difference between experimental and control group at (P = 0.001) level.

SECTION V

ASSOCIATION OF POST TEST LEVEL OF NECK PAIN AND FUNCTIONAL DISABILITY WITH SELECTED DEMOGRAPHIC AND CLINICAL VARIABLES OF THE SAMPLES IN EXPERIMENTAL GROUP.

Table: 5.1. Association between the post test level of neck pain with the demographic variables such as age, gender and years of working experience in experimental group

n= 30

Demographic variables	Level of pain reduction score				Total	Chi square test
	Below average(≤2.73)		Above average(>2.73)			
	N	P (%)	n	P (%)		
Age						
a) 21-25 years	9	81.8	2	18.2	11	$\chi 2=7.12$
b) 26-30 years	5	33.3	10	66.7	15	P=0.03*
c) 31-35 years	1	25.0	13	75.0	4	S
Gender						$\chi 2=5.00$
a) Male	6	33.3	12	66.7	18	P=0.03*
b) Female	9	75.0	3	25.0	12	S
Years of working experience						
a) 1-2 years	7	77.7	2	22.3	9	$\chi 2=7.79$
b) 2-3 years	5	62.5	3	37.5	8	P=0.05*
c) 3-4 years	2	28.6	5	71.4	7	S
d) 4-5 years	1	16.7	5	83.3	6	

S=Significant (*denotes significant at 5% level)

Table: 5.1 shows that there was a statistically significant association found between the post test level of neck pain with demographic variables such as age, gender and years of working experience at 5% level.

Table 5.2 Association between the post test level of neck pain with clinical variables such as duration of neck pain and working hours in experimental group.

n= 30

Clinical variables	Level of pain reduction score				Total	Chi square test
	Below average(≤2.73)		Above average(>2.73)			
	N	P (%)	n	P (%)		
How long have you been suffering with neck pain?						
a) Less than a month	2	22.3	7	77.7	9	$\chi 2=6.47$ P=0.03* S
b) 1-< 3 months	5	45.5	6	54.5	11	
c) 3-< 6 months	8	80.0	2	20.0	10	
How long do you work with computer per day?						$\chi 2=8.71$ P=0.05* S
a) 8 hours	1	11.1	8	88.9	9	
b) 8-10 hours	9	60.0	6	40.0	15	
c) > 10 hours	5	83.3	1	16.7	6	

S=Significant (*denotes significant at 5% level)

Table 5.2 shows that there was a statistically significant association found between the post test level neck pain and clinical variables such as duration of neck pain and duration of working hours with computer at 5% level.

Table: 5.3. Association between the post test level of functional disability with the demographic variables such as age, gender and habits in experimental group.

n= 30

Demographic variables	Level of functional disability reduction score				Total	Chi square test
	Below average(≤5.00)		Above average(>5.00)			
	n	P (%)	n	P (%)		
Age						
a) 21-25 years	8	72.7	3	27.8	11	$\chi 2=6.49$
b) 26-30 years	7	46.7	8	53.3	15	P=0.03*
c) 31-35 years	0	0.0	4	100.0	4	S
Gender						$\chi 2=8.88$
a) Male	5	27.8	13	72.2	18	P=0.01*
b) Female	10	56.2	2	44.8	12	S
Habits						
a) Alcoholism	4	80.0	1	20.0	5	$\chi 2=8.92$
b) Smoking	6	85.7	1	14.3	7	P=0.01**
c) None	5	27.8	13	72.2	18	S

S=Significant (*denotes significant at 5% level) (denotes significant at 1%level)**

Table: 5.3 shows that there was a statistically significant association found between the post test level of functional disability and demographic variables such as age and gender at 5% level and with habits at 1% level.

Table 5.4 Association between the post test level of functional disability with clinical variables such as duration of neck pain, working hours and mode of transport.

n= 30

Clinical variables	Level of functional disability reduction score				Total	Chi square test
	Below average(≤5.00)		Above average(>5.00)			
	n	%	n	%		
How long have you been suffering with neck pain?						
a) Less than a month	3	33.3	6	66.7	9	$\chi 2$=1.81
b) 1-< 3 months	7	63.6	4	36.4	11	P=0.03*
c) 3-< 6 months	5	50.0	5	50.0	10	S
How long do you work with computer per day?						
a) 8 hours	1	11.1	8	88.9	9	$\chi 2$=8.71
b) 8-10 hours	9	60.0	6	40.0	15	P=0.01*
c) > 10 hours	5	83.3	1	16.7	6	S
How do you commute to work place?						
a) By bus	2	40.0	3	60.0	5	$\chi 2$=8.46
b) By two wheeler	10	76.9	3	23.1	13	P=0.04*
c) By car	2	50.0	2	50.0	4	S
d) By train	1	12.5	7	87.5	8	

S=Significant (*denotes significant at 5% level) (denotes significant at 1%level)**

Table 5.4 shows that there was a statistically significant association found between the post test level of functional disability with demographic variables such as duration of neck pain, working hours and mode of transport at 5% level.

SECTION VI

CORRELATION OF POST TEST LEVEL OF NECK PAIN AND FUNCTIONAL DISABILITY AMONG COMPUTER PROFESSIONALS.

Table 6.1: Correlation between post test level of neck pain and functional disability among computer professionals in experimental group and control group.

Group	Karl Pearson co-efficient co-relation value in post test
Experimental	r = 0.58 P = 0.001***
Control	r = 0.36 P = 0.01**

(* denotes highly significant at 1% level) (**denotes significant at 1%level)**

Table: 6.1 shows that, there is positive, significant and moderate correlation (r=0.58) between neck pain and functional disability in the experimental group. Whereas, in the control group there is a positive, significant and fair correlation (r=0.36) between neck pain and functional disability. It means when the level of neck pain increases functional disability also increases.

CHAPTER V

DISCUSSION

The present study was aimed to assess the effectiveness of isometric exercise on neck pain and functional disability among computer professionals in selected IT companies, Chennai. A total of 60 samples were selected by non probability purposive sampling method (30 in experimental group and 30 in control group). Demographic and clinical data were collected by using structured self instruction tool. Pre and post test level of neck pain and functional disability was assessed before and after administration of isometric exercise.

The collected data were tabulated and analyzed using descriptive and inferential statistics and results were interpreted. The discussion is based on the objectives specified in the study.

The significant findings of the study were as follows

In relation to demographic variables

- In relation to age, fifty percentage of the samples in the experimental group and 50% of the samples the in control group were in age group of 26-30years.
- Regarding the gender, 60% of samples in the experimental group and 63.3% of samples in the control group were male.

- In the experimental group 53.3% of the samples were married. Whereas in the control group 56.7% of the samples were single.
- Regarding religion, 73.3% of samples in the experimental group and 66.7% of samples in the control group belongs to Hindu religion.
- In relation to educational status, 56.7% of samples in the experimental group, 60% of samples in the control group were graduates.
- In the experimental group, forty percentage of samples and in the control group 46.7% samples monthly income was Rs.16, 000-20,000.
- In the experimental group thirty percentage of the samples were having working experience of 1-2 years. Whereas in the control group 26.7% of the samples were having working experience of 3-4 years and 4-5 years.
- In the experimental group, 83.3% of the samples and in the control group 80% of the samples were non-vegetarian.
- Regarding type of family, in the experimental group 56.7% samples and in the control group 50.0% of samples belong to nuclear family.
- In relation to habits 23.3% of samples in the experimental group and 43.3% of the samples in the control group were having the specifics habit of smoking.

Regarding clinical variables

- In both group all of them were having neck pain. In the experimental group, 36.7% of samples were having neck pain for1-<3 months and 33.3% of them were having neck pain3-<6 months. Whereas in the control group 40% of the samples were

having neck pain for 3-<6 months and 36.7% of samples were having neck pain for 1-<3 months duration.

- In the experimental group, 40 % of the samples and in the control group 43.3% of the samples were experiencing tingling and pricking type of pain.
- In the experimental group, 50% of the samples and in the control group 43.3% of the samples were working for 8-10 hours per day, with the computer.
- In the experimental group, 43.3% of the samples and in the control group 46.7% of the samples were using two wheeler to commute to work place.
- In the experimental group, 53.3% of the samples and in the control group 60% of them were travelling for 1-2 hours per day.
- In the experimental group 73.3% samples and in control group 66.7% samples were using cell phone for 4-6 hours per day.
- Fifty percentage of samples in the experimental group and 53.3% of samples in the control group were adapting 70 degree sitting position while working with computer.
- Seventy percentage of the samples in the experimental group and 73.3% of the samples in the control group were not utilizing rest hours in between work.
- In both groups none of them had taken self care measures for neck pain.

The findings of the study as per objectives are

The first objective was to assess the neck pain and functional disability among computer professionals before and after intervention

Table: 3.1 showed that in the experimental group, majority (60.0%) of the samples had moderate level of neck pain and 40.0% of them had mild level of neck pain in pre test. In post test 66.7% of the samples had mild level of neck pain and 33.3% of them had no pain. Whereas in the control group, majority (56.7%) of the samples had moderate level of neck pain and 43.3% of them had mild level of neck pain in pre test. In post test, 50% of the samples had moderate level of neck pain and 50.0% of them had mild level of neck pain.

This result was supported by Vijay, S. (2013) who reported that In India 30% of computer professional had experienced neck pain..

Table: 3.2 showed that in experimental group, majority (63.3%) of the samples had mild functional disability and 36.7% of them had moderate functional disability in pre test. The post test results showed that majority (60.0%) of the samples had mild functional disability and 40.0% of them had no functional disability. Whereas in the control group, in pre test and post test twenty (66.7%) samples had mild functional disability and 10 (33.3%) of them had moderate functional disability.

This result was supported by Shah, S.A. & Patel, P.R. (2015) who reported that in India 47% of computer professionals experienced neck pain and functional disability.

The second objective was to assess the effectiveness of isometric exercise on neck pain and functional disability among computer professionals

Table: 4.1 showed that in the experimental group, the pre test mean neck pain score was 3.83 with the standard deviation of 0.87. Whereas in the post test, the mean neck pain score was 1.10 with the standard deviation of 0.99. In control group, the pre test mean neck pain score was 3.63 with the standard deviation of 0.62 and in post test the mean neck pain score was 3.53 with the standard deviation of 0.68.

In relation to functional disability in the experimental group, the pre test mean functional disability score was 16.97 with the standard deviation of 2.34. Whereas in post test, the mean functional disability score was 11.97 with the standard deviation of 2.52. In control group, the pre test mean functional disability score was 16.67 with the standard deviation of 2.17 and in post test, the mean functional disability score was16.50 with the standard deviation of 2.27.

From the above findings it is evident that the experimental group pre test mean neck pain functional disability score is higher than the post test mean neck pain and functional disability score. Whereas, comparing the control group pre and post mean neck pain and functional disability score is almost same. It revealed that there was a statistically significant difference in pre and post test score at $P = 0.001$ level. Hence we can infer that the isometric exercise had effect in reducing pain and functional disability.

The above findings were supported by the study conducted by Liyanage, E. et al. (2014) who reported that stretching with isometric exercise proved more beneficial in reducing neck pain and functional disability among computer professionals.

Table 4.2 showed that in the experimental group, the pre test mean neck pain score was 3.83 with the standard deviation of 0.87. In control group, the pre test mean neck pain score was 3.63 with the standard deviation of 0.62. In the post test experimental group mean neck pain score was 1.10 with the standard deviation of 0.99. Whereas in the control group, the post test mean neck pain score was 3.53 with the standard deviation of 0.68.

In relation to functional disability in the experimental group, the pre test mean score was 16.97 with the standard deviation of 2.34. In control group, the pre test mean score was 16.67 with the standard deviation of 2.17. In post test, the mean score was 11.97 with the standard deviation of 2.52. Where as in the control group the mean score was16.50 with the standard deviation of 2.27in post test.

From the above findings we can infer that there is no difference in the mean neck pain and functional disability score in pre test among experimental and control group. Whereas the experimental group post test mean neck pain and functional disability score was lesser than the control group. From this it is evident that there was a statistically significant difference in experimental and control group at $P = 0.001$ level. Hence we can infer that the isometric exercise had effect in reducing pain and functional disability.

The study was conducted by Kanchanathu, S.J, et al. (2014) who reported that the neck pain and functional disability considerably reduces with isometric neck exercises.

Hence the hypothesis (H0) stated that, there will be no significant difference between pre and post interventional level of neck pain and functional disability among experimental and control group was rejected.

The third objective was to associate the post test level of neck pain and functional disability with selected demographic variables and clinical variables among computer professionals in experimental group

Table: 5.1 shows that there was statistically significant association between the post test level of neck pain and demographic variables such as age, gender and years of working experience at 5% level of significance.

The findings was supported by the study conducted by Shah.S.A, et al. (2015**)** It showed that neck pain is affected by individual variables and work related variables which showed that there was a statistically significant association between the neck pain and variables such as age, gender and duration of job.

Table 5.2 showed that there was statistically significant association found between the post test level of neck pain and clinical variables such as duration of neck pain and working hours with the computer at 5% level of significance.

The above findings of the study supported by the study conducted by Aggarwal, P. et al. (2013) who reported that there were significant association between neck pain with duration of working hours.

Table: 5.3 showed that, there was statistically significant association found between the post test level of functional disability and demographic variables such as age, gender at 5% level and with habits at 1% level. Table 5.4 showed that there was a statistically significant association found between the post test level of functional disability and clinical variables such as duration of neck pain, working hours and mode of transport at 5% level.

The above findings of the study supported by the study conducted by Aggarwal, P. et al. (2013) who reported that there were significant association between level of functional disability with age, gender and duration of working hours. The functional disability increased with age, longer working hours and generally women had higher neck pain than men.

The study findings support the assumption that the neck pain and functional disability will be influenced by demographic and clinical variables.

The fourth objective was to find correlation of post test level of neck pain and functional disability among computer professionals

Table: 6.1 shows that in, there is positive, significant and moderate correlation(r=0.58) between neck pain and functional disability in the experimental group. Whereas in the control group there is a positive, significant and fair correlation (r=0.36) between neck pain and functional disability. It means that as the level of neck pain decreases, the functional disability also decreases.

The above finding shows that experimental group ‘r’ value is higher than the control group ‘r’ value. It means that when neck pain score decreases, functional disability score also decreases.

The above findings were supported by the following study conducted by Kumar, S. et al. (2013) reported that there is statistically significant, positive correlation between level of neck pain and level of disability.

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

SUMMARY

The objective of the study was to assess the effectiveness of Isometric exercise on neck pain and functional disability among computer professionals. A quasi experimental pre test and post test design was chosen for conducting the study. The review of literature provided the base and in depth knowledge about neck pain and functional disability. The content validity of the tool was obtained from the experts and the reliability was determined through pilot study

The study was conducted in the selected IT companies in Chennai namely K.K.M Soft pvt.Ltd and E-Sales pvt.Ltd with prior permission obtained from each company. A total of 60 samples were selected by using purposive sampling technique among computer professionals. Thirty samples in experimental group and 30 samples in control group were assigned. The data was collected, analyzed, tabulated and the results were interpreted.

The major findings of the study were as follows,

- In relation to age, fifty percentage of the samples in the experimental group and 50% of the samples the in control group were in age group of 26-30years.

- Regarding the gender, 60% of samples in the experimental group and 63.3% of samples in the control group were male.
- In the experimental group 53.3% of the samples were married. Whereas in the control group 56.7% of the samples were single.
- Regarding religion, 73.3% of samples in the experimental group and 66.7% of samples in the control group belongs to Hindu religion.
- In relation to educational status, 56.7% of samples in the experimental group, 60% of samples in the control group were graduates.
- In the experimental group, forty percentage of samples and in the control group 46.7% samples monthly income was Rs.16, 000-20,000.
- In the experimental group thirty percentage of the samples were having working experience of 1-2 years. Whereas in the control group 26.7% of the samples were having working experience of 3-4 years and 4-5 years.
- In the experimental group, 83.3% of the samples and in the control group 80% of the samples were non-vegetarian.
- Regarding type of family, in the experimental group 56.7% samples and in the control group 50.0% of samples belong to nuclear family.
- In relation to habits 23.3% of samples in the experimental group and 43.3% of the samples in the control group were having the specifics habit of smoking.
- In both group all of them were having neck pain. In the experimental group, 36.7% of samples were having neck pain for1-<3 months and 33.3% of them were having neck pain3-<6 months. Whereas in the control group 40% of the samples were

having neck pain for 3-<6 months and 36.7% of samples were having neck pain for 1-<3 months duration.

- In the experimental group, 40 % of the samples and in the control group 43.3% of the samples were experiencing tingling and pricking type of pain.
- In the experimental group, 50% of the samples and in the control group 43.3% of the samples were working for 8-10 hours per day, with the computer.
- In the experimental group, 43.3% of the samples and in the control group 46.7% of the samples were using two wheeler to commute to work place.
- In the experimental group, 53.3% of the samples and in the control group 60% of them were travelling for 1-2 hours per day.
- In the experimental group 73.3% samples and in control group 66.7% samples were using cell phone for 4-6 hours per day.
- Fifty percentage of samples in the experimental group and 53.3% of samples in the control group were adapting 70 degree sitting position while working with computer.
- Seventy percentage of the samples in the experimental group and 73.3% of the samples in the control group were not utilizing rest hours in between work
- In both groups none of them had taken self care measures for neck pain.
- The assessment of level of neck pain shows that in the experimental group, majority (60.0%) of the samples had moderate level of neck pain and 40.0% of them had mild level of neck pain in pre test. In post test 66.7% of the samples had mild level of neck pain and 33.3% of them had no pain.

- The assessment of level of functional disability shows that in experimental group, majority (63.3%) of the samples had mild functional disability and 36.7% of them had moderate functional disability in pre test. Whereas in post test majority (60.0%) of the samples had mild functional disability and 40.0% of them had no functional disability.
- The experimental group pre test mean neck pain score (3.83) and functional disability score (16.97) is higher than the post test mean neck pain score (1.10) and functional disability score (11.97).
- The experimental group post test mean neck pain score (1.10) and functional disability score (11.97) was lesser than the control group mean neck pain score (3.53) and functional disability score (16.50).
- There was a significant association between the post test level of neck pain and demographic variables such as age, gender and years of working experience at 5% level of significance.
- There was significant association found between the post test level of neck pain and clinical variables such as duration of neck pain and working hours with the computer at 5% level of significance.
- There was significant association found between the post test level of functional disability and demographic variables such as age, gender at 5% level of significance and habits at 1% level of significance.

- There was a statistically significant association found between the post test level of functional disability and clinical variables such as duration of neck pain, working hours and mode of transport at 5% level of significance.
- In post test there was positive, significant and moderate correlation (r=0.58) between neck pain and functional disability in the experimental group. Whereas in the control group there is a positive, significant and fair correlation (r=0.36) between neck pain and functional disability at 1% level of significance.

CONCLUSION

The study finding showed that Isometric exercise was effective in reducing neck pain and functional disability among computer professionals. Isometric exercise can be used as a non pharmacological measure to reduce neck pain and functional disability.

IMPLICATION

The findings of the study has its implication in various branches of nursing namely nursing practice, nursing education, nursing administration and nursing research

NURSING PRACTICE

- Isometric exercise can be incorporated as one of the routine nursing interventions in reducing neck pain and functional disability among computer professionals.
- Nurses can demonstrate the steps of isometric exercise to persons with neck pain and encourage them to practice it at home.

NURSING EDUCATION

- The nurse educator can create awareness and demonstrate isometric exercise to the students in the classroom.
- The nurse educator can motivate the students to educate about isometric exercise for patient with neck pain and functional disability during their clinical and community posting.

NURSING ADMINISTRATION

- Nurse administrator can participate in formulating polices and protocols to enhance Isometric exercise as one of the regular exercise program for all computer professionals
- Nurses can be educated about Isometric exercise through in-service education and demonstration.
- Nurses can prepare awareness material about isometric exercise to reduce neck pain.
- Nurse administrator can plan and organize awareness programme on causes of neck pain and functional disability among computer professionals and measures to overcome the problem in community settings.

NURSING RESEARCH

- Research can be conducted to assess the effectiveness of isometric exercise among bus drivers.
- The findings of this study can be disseminated through conferences, seminar and it can be published in journals.
- The study will be a valuable reference material for future research.

RECOMMENDATIONS

Based on the present study findings the following recommendations were made:

- The study can be conducted on a larger sample to generalize the findings.
- The study can be conducted to identify the prevalence of neck pain.
- A comparative study can be conducted to assess the effectiveness of Isometric exercise with dynamic exercise in reducing neck pain among men and women.
- A study can be conducted to observe the working posture among computer professionals.
- A structured teaching programme can be conducted to assess the effectiveness of isometric exercise in improving the neck muscle strength among computer professionals.
- A comparative study can be conducted to assess the effectiveness of Isometric exercise with dynamic exercises in reducing neck pain and functional disability among computer professionals.

- ❖ A study can be conducted to assess the knowledge, attitude and practice towards prevention of neck pain among computer professionals.
- ❖ A study can be conducted to assess the effectiveness on isometric exercise on other musculoskeletal disorders like low back pain and osteoarthritis.

LIMITATION

There were no limitations faced by the investigator during the study

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INFORMED CONSENT FORM

I have been informed about the purposes of the study being conducted by Ms.K.Mullai., M.Sc (Nursing) student of M.A.Chidambaram College of Nursing, Adyar, Chennai and I have no objection in participating in the study. I also give my full consent for the use of this data for the purpose of any presentation or publication.

Signature:

Name:

Date:

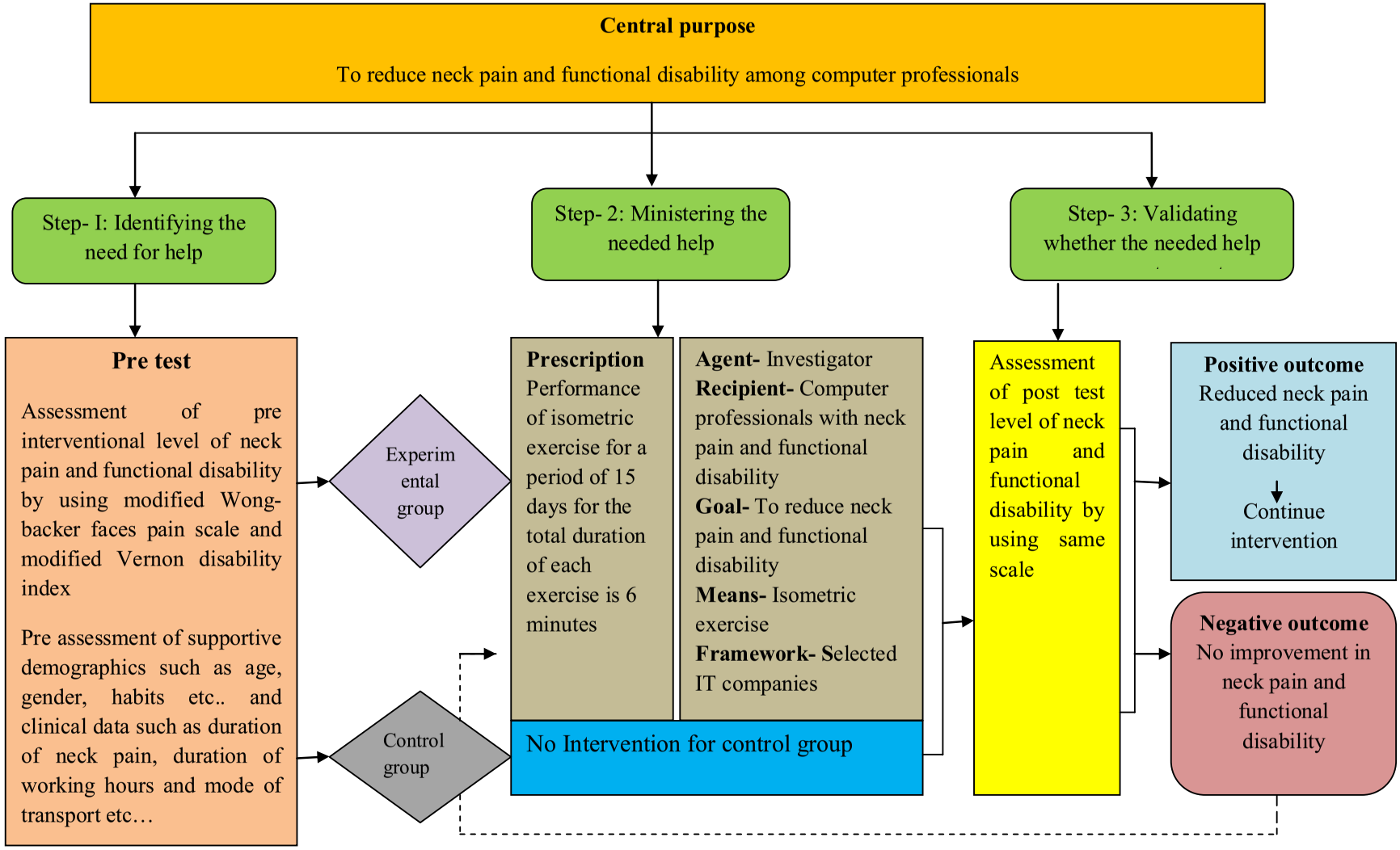


FIGURE NO 1: Conceptual frame work based on Weidenbach's Helping Art of Clinical Nursing (2012)

LESSON PLAN ON ISOMETRIC EXERCISE

GENERAL OBJECTIVE

At the end of the session, the computer professionals with neck pain and functional disability will gain adequate knowledge regarding isometric exercise and develop positive attitude towards the practice of Isometric exercise to reduce neck pain and functional disability in day today life.

SPECIFIC OBJECTIVES

At the end of session, the computer professional will be able to,

define isometric exercise

list out the purposes of Isometric exercise

enumerate the indications and contraindications of Isometric exercise

explain the procedure in detail about Neck stretching and Isometric exercise

enlist the advantages of Isometric exercise

S. No	Time	Specific Objective	Content	Researcher's Activity	Learner Activity
1.			**INTRODUCTION** Neck pain is a common problem which is on the increase as an occupational disease. constant hours of working on the computer is the main cause of neck pain among computer professionals. Other reasons include stress, bad posture the exercise can help to alleviate neck pain, increase range of motion, mobility and strengthen the neck muscle	Introducing the topic	Listening
2		define isometric exercise	**DEFINITION** Isometric exercise is a type of strengthening exercise involving the static contraction of a muscle without any visible movement in the angle of the joint	Explaining	Listening
3		list out the purposes of isometric exercise	**PURPOSES** ➢ Strengthen the cervical muscles ➢ Increase the flexibility of neck ➢ Reduce neck pain	Listing the purposes	Listening

			➢ Provide greater stability to the neck and trunk help establish and maintain good posture ➢ Increasing strength protect future neck problems		
4		enumerate the indications and contraindications of Isometric exercise	**INDICATIONS** Computer professionals with ♦ Neck Pain ♦ Stiff Neck ♦ Cervical Muscle Sprain & Strain ♦ Cervical radiculopathy ♦ Neck arthritis ♦ Whiplash Injury to the Neck **CONTRAINDICATIONS** ⌖ Degeneration in the cervical spine ⌖ Cervical disc injury ⌖ Heart disease ⌖ Hypertension	Enumerating the indications and contra indications	Listening

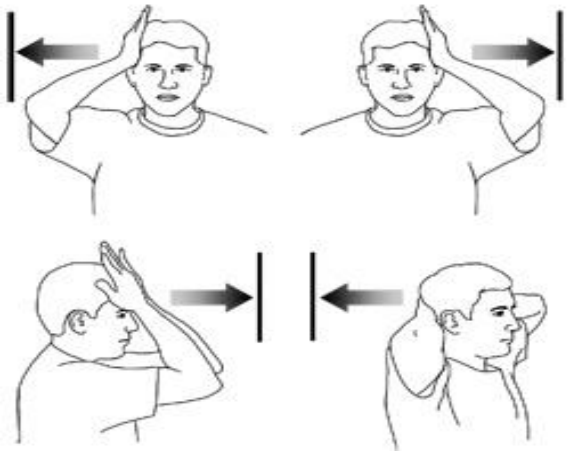
5		explain the procedure in detail about Neck stretching and Isometric exercise	**Neck stretching and Isometric exercise** **Pre procedure** Instruct the patient to sit straight, and maintain the head in neutral position and to do the following steps Stretching The goal of neck stretch is to stretch the neck muscles, improve flexibility and decrease neck stiffness. **Steps:** ♦ **Neck flexion:** samples were instructed to bring the head forward and attempt to touch the chin to the chest until a stretch is felt in the back of the neck ♦ **Neck extension:** Gently bend the head backward until a stretch is felt in the back of the neck ♦ **Right and left lateral flexion:** gently bend the neck to right side to touch the ear to shoulder then repeat the same step on left side.	Demonstrating stretching and isometric exercise	Observing Observing

			♦ **Rotation:** turn the head to the right as far as possible, try to bring the chin over the shoulders. then repeat the same step on another side. Hold this position for about 12 seconds, rest for up to 3 seconds, and then repeat 5 times. For 3 days Total duration of exercise is 5 minutes **Isometric exercise** On 4th day samples were instructed to do isometric exercise they were instructed to sit straight and maintain the head in neutral position and to do the following steps, while they were asked to press firmly and do not tip the head. ➢ **Step – 1 Static flexion** Samples were instructed to put the heels of both hands against forehead just above eyebrows Then Press hands against forehead at the same time press head against the hands. Hold this position for about 5 seconds, rest for up to 3 seconds, then repeat 10 times		

			➢ **Step – 2 Static Extension** Samples were instructed to put one hand over the other hand and place their hands against the lower back of the head then Press hands against head at the same time press head straight back against the hands Hold this position for about 5 seconds, rest for up to 3 seconds, then repeat 10 times ➢ **Step – 3 Lateral flexion 1 (Right)** Samples were instructed to place right hand against the right side of head above the ear. Press against the side of head with hand, also press head back against the hand. Hold this position for about 5 seconds, rest for up to 3 seconds, then repeat 10 times ➢ **Step – 4 Lateral flexion 2 (Left)** Samples were instructed to place left hand against the left side of head above the ear. press against the side of head		

			with hand, also press head back against the hand. Hold this position for about 5 seconds, rest for up to 3 seconds, then repeat 10 times Total duration is 6 minutes **POST PROCEDURE CARE** Encouraged the computer professionals to repeat the exercise after six hours every day Continue to do the exercises two times a day for fifteen days. The time schedule of doing exercise is 10am &5pm.		
5		enlist the advantages of Isometric exercise	**ADVANTAGES** * Inexpensive * It have little or no joint movement * Less risk of injury and re injury * It does not need any machine or equipment * Practically done anywhere and anytime		

			CONCLUSION Isometric exercise is one of the simplest forms of exercise. Neck pain patients generally have weak muscle in the neck by strengthening and stretching those muscles, more blood flow comes to the area to help repair injury.		
			REFERENCES Kisner, C & Cloby, L.A. (2007) *Therapeutic Exercises Foundations and Techniques*, 5th edition, jaypee brothers medical publisher pvt.ltd. Thomas, T.W. et al., (2010) *Efficacy of isometric exercise for patient with chronic neck pain.* Lippincott Williams & wilkins 1252-2499.		

			STEPS IN NECK STRETCHING 		
			STEPS IN ISOMETRIC NECK STRENTHENING 		

INVESTIGATOR DEMONSTRATING THE STEPS OF STRETCHING AND ISOMETRIC EXERCISE

STEPS IN NECK STRETCHING

STEP 1: NECK FLEXION

STEP 2: NECK EXTENSION

STEP 3: LATERAL FLEXION-Right & Left

STEP 4: ROTATION

STEPS OF ISOMETRIC EXERCISE

STEP 1: STATIC FLEXION

STEP 2: STATIC EXTENSION

STEP 3: LATERAL FLXION-Right & Left